005395

1980 HAMILTON-WENTWORTH COLLISION REPORT

PREPARED BY THE CITY OF HAMILTON TRAFFIC DEPARTMENT

1980 HAMILTON-WENTWORTH COLLISION REPORT

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR URBAN STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

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1980 HAMILTON-WENTWORTH MOTOR VEHICLE COLLISION REPORT

Introduction

This annual report is a summary of factors associated with traffic collisions that occurred in the Regional Municipality of Hamilton-Wentworth in 1980.

Traffic collisions are a primary cause of accidental deaths (Appendix Exhibits A-1, A-2, and A-3), injuries and associated property losses. The intention of this report is to provide factual information to those agencies and persons concerned with the safety of the roadway transportation system within the Regional Municipality of Hamilton-Wentworth.

Traffic collisions frequently involve complex interactions between human behavior, vehicle characteristics, and the environment. The factor or factors responsible for causing a collision is not always the most obvious nor is it always readily apparent. Caution should be exercised if drawing conclusions from the statistics presented in this report and conclusions should be drawn only with appropriate qualifications and supportive information.

1980 HAMILTON-WENTWORTH COLLISION REPORT

Summary:

* In 1980, 8,305 reportable traffic collisions occurred on municipal roadways in the Region of Hamilton-Wentworth. These collisions resulted in:-

- 21 driver or passenger fatalities (5 motor vehicle drivers, 6 motorcyclists, 1 bicyclist and 9 riders or passengers)
- 12 pedestrian fatalities
- 4,366 driver or passenger injuries
- 434 pedestrian injuries
- 23,806 persons or approximately 6 percent of the Regional population being involved in a reportable traffic collision in 1980
- over 13 million dollars in property damages (as estimated at the time of the collision)
- 39 million dollars (estimated) in damages when all collision costs including medical costs, loss of income and other related costs are taken into account

* Historical measurements of the average rates of collision involvement for the period from 1951 - 1980 were found to be as follows:-

- 20.2 collisions per 1,000 population per year (no trend indicated)
- 0.08 deaths per 1,000 population per year (no trend indicated)
- 11.7 injuries per 1,000 population per year (upward trend indicated)
- 1.1 pedestrian injuries per 1,000 population per year (downward trend indicated)

* The overall frequency of collisions in Hamilton-Wentworth is generally lower than other major Canadian municipalities (Appendix Exhibit A-9).

* The overall frequency rates of fatalities in the City of Hamilton are generally lower than other Canadian cities and other U.S. cities of similar population (Appendix A-10).

* The period from 12 midnight to 5 a.m. exhibits the highest ratio of collisions to vehicle volume using the street system.

* The greatest causes of traffic collisions were driver or pedestrian error; either errors in judgement or perception, or non-observance of traffic regulations.

* The predominant improper driver actions indicated in collisions were "following too close" and "failure to yield right-of-way".

* Drivers under 20 years of age were involved in a disproportionate number of collisions relative to the number of drivers in this age group that are licenced to drive. This age group was involved in 14.9 percent of the reported collisions although it comprises only 7 percent of the licenced driving population.

* The additional expense incurred by persons involved in traffic collisions in the Region in 1980 which could have been prevented had they been wearing their seatbelts is estimated to be in the order of $320,000 dollars.

* Twelve percent of reported collisions involved one or more drivers who had been drinking.

* Alcohol was associated with a high proportion of collisions (39 percent) which occurred in the hours between 10 p.m. and 3 a.m. from Wednesdays to Sundays and in night-time collisions (24 percent of collisions between 6 p.m. and 6 a.m.).

Note: These figures are indicative of alcohol being present in the bloodstream of one or more of the drivers involved in the collision and do not necessarily suggest that alcohol was the proximate cause of the collision.

* Non-licenced drivers were less likely to be driving properly, and more likely to be under the influence of alcohol or drugs when involved in a collision.

* Motorcycle operators were more likely to be driving properly at the time of the collision and more likely to receive injuries if involved in a traffic collision.

* Children between 5 and 9 years of age were involved in a disproportionate number of pedestrian collisions (20%) compared with their proportion of the regional population (7%). Pedestrians in this age group were most frequently involved in a collision as the result of entering the roadway unexpectedly; that is, running into the roadway or entering the roadway from behind a parked vehicle or object.

* Vehicle defects were reported in less than 2 percent of the vehicles involved in collisions. It should be noted that the presence of a recorded vehicle defect does not necessarily suggest that it was the proximate cause of the collision.

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Chapter One
Trends

Cengage Learning

General

Since 1951, the number of motor vehicle collisions and persons injured in motor vehicle collisions in Hamilton and Hamilton-Wentworth has increased (Exhibits 1-4, 1-5, 1-6). However, in the same time period, the population of the reporting area has approximately doubled and motor vehicle registrations have risen by a factor of 3 (Appendix Exhibit A-4). There is also evidence to suggest that, with an improving highway system, each registered vehicle is driven a greater distance annually. The effect of increased population, vehicle registration and vehicle use is increased opportunity for motor vehicle collisions to occur.

Normalizing the Data

To fairly assess historical trends, collision data should be expressed in terms of rate (normalized) through the use of one of several factors. Annual motor vehicle use information would provide the most accurate assessment of a motorist's exposure, and hence, likelihood of involvement in a collision. However, this information is not available. Motor vehicle registration data has not been available for the Hamilton area since 1973. The lack of these data hampers the assessment of historical trends and limits the accuracy of future predictions.

Population is the only suitable normalizing factor presently available. Therefore, Exhibits 1-1, 1-2, 1-3 and associated analysis in this chapter refer to data which has been calculated on a population rate basis.

Collisions

The overall motor vehicle collision rate is shown in Exhibit 1-1. As of January 1, 1978, the reporting level for property damage only collisions was raised from $200.00 to $400.00. In 1980 the overall number of collisions was approximately 6 percent lower than in 1979.

Due to changes in the reporting criteria and reporting area for the period for which historical data are available, trend analysis of the number of collisions would not be appropriate or meaningful.

Personal injury collisions (Exhibit 1-1) show a significant (at the 99 percent level) decline from 1965 to 1980.

The results of this regression analysis and others in this chapter are included in Appendix Exhibit A-7.

Injuries

The personal injury rate graph (Exhibit 1-2), parallels the closely related injury collision graph (Exhibit 1-1). From 1951 to 1980 a significant increase in the personal injury rate is noted, while from 1963 to 1980 a slight decrease (although not statistically significant) is shown.

The rate of occurrence of pedestrian injuries (Exhibit 1-2) has demonstrated a modest but consistent decrease from 1951 to 1980.

Fatalities

In 1980, thirty-three persons died in motor vehicle collisions.

Since fatal collisions are rare events, small changes in the number of fatalities cause large fluctuations in the fatality rate (Exhibit 1-3). These fluctuations reduce the validity of statistical tests. Thus while the fatality rate for all collisions shows a slight downward trend, especially since 1968, this trend is not statistically significant. The overall fatality rate thus appears unchanged during the past 25 years. Comparable patterns are evident for Ontario and Canada (Appendix Exhibit A-5).

The fatality rate for pedestrians does display a reduction which is significant over the last 29 years.

Exhibit 1-1

TRAFFIC COLLISION RATES - 1951 TO DATE
PERSONAL INJURY COLLISION RATES - 1954 TO DATE

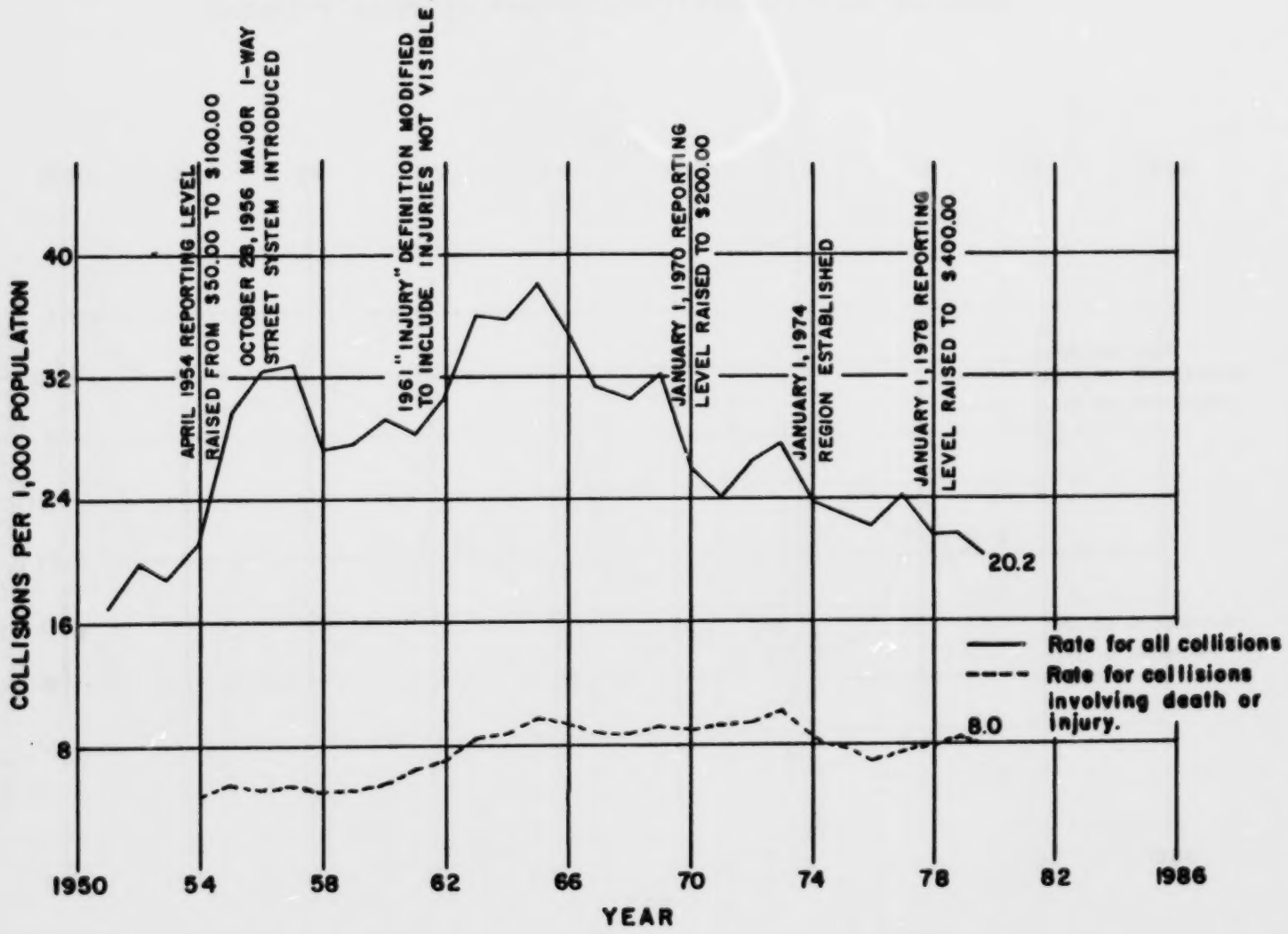

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Exhibit 1-2

PERSONAL INJURY RATES IN TRAFFIC COLLISIONS 1951 TO DATE

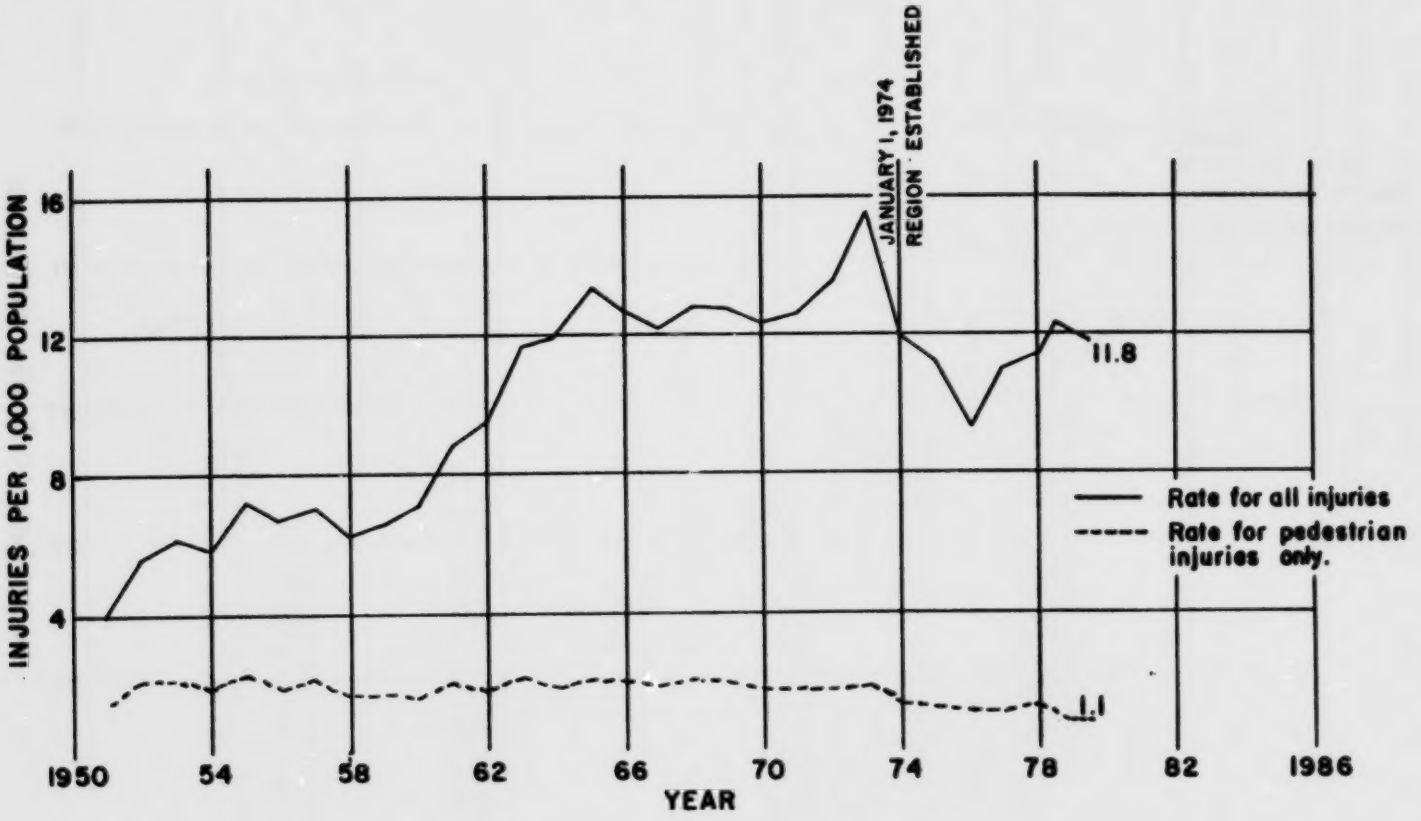

Exhibit 1-3

FATALITY RATES IN TRAFFIC COLLISIONS - 1951 TO DATE

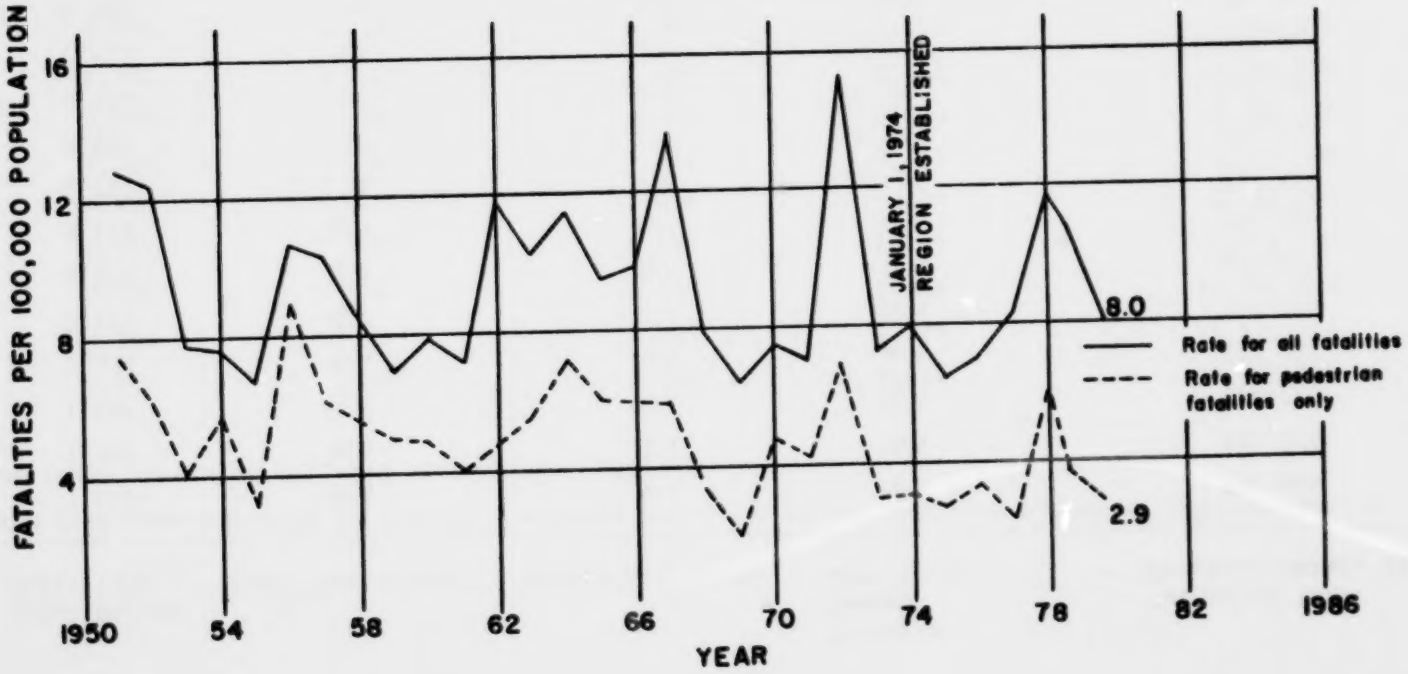

Exhibit 1-4

COLLISION STATISTICS - HISTORIC TRENDS

Year	Total No. of Collisions	Fatal Collisions	Injury Collisions	Property Damage Collisions	Estimated Total Property Damage ($)
1947	1,052	N/A	N/A	N/A	209,965
1948	1,351	N/A	N/A	N/A	312,170
1949	1,745	N/A	N/A	N/A	378,235
1950	2,304	N/A	N/A	N/A	522,535
1951	3,421	N/A	N/A	N/A	752,185
1952	4,219	N/A	N/A	N/A	892,329
1953	4,114	N/A	N/A	N/A	974,290
1954[(a)]	4,787	16	1,070	3,701	841,762
1955	6,691	13	1,297	5,381	1,014,339
1956	7,528	25	1,222	6,281	1,169,797
1957	7,973	25	1,376	6,572	1,382,399
1958	6,898	21	1,260	5,617	1,274,017
1959	7,189	18	1,337	5,834	1,388,015
1960	7,763	20	1,496	6,247	1,742,296
1961[(a)]	7,547	18	1,744	5,785	1,851,000
1962	8,338	28	1,904	6,406	2,160,000
1963	9,554	27	2,309	7,218	2,560,000

1964	9,948	32	2,455	7,461	2,886,000
1965	10,783	26	2,789	7,968	3,413,000
1966	9,950	27	2,757	7,166	3,521,000
1967	9,106	35	2,575	6,496	3,327,000
1968	8,983	21	2,547	6,415	4,449,000
1969	9,589	19	2,721	6,849	3,999,000
1970[a]	7,799	23	2,676	5,100	3,918,000
1971	7,314	22	2,821	4,471	4,647,000
1972	8,065	39	2,901	5,125	5,464,000
1973	8,499	23	3,143	5,333	6,208,000
1974[b]	9,599	29	3,364	6,206	7,886,000
1975	9,354	24	3,219	6,111	8,243,000
1976	9,146	28	2,816	6,302	9,262,000
1977	10,011	33	3,182	6,796	10,514,000
1978	8,636	45	3,246	5,345	12,064,000
1979	8,798	39	3,389	5,370	13,325,000
1980	8,305	33	3,253	5,019	13,708,000

(a) Collision reporting criteria changed (See Page 4).

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

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Exhibit 1-5

PERSONAL INJURIES AND FATALITIES - HISTORIC TRENDS

Year	Total No. of Collisions	Persons Injured	Injury Rate/ 1,000 Pop.	Persons Killed	Death Rate/ 100,000 Pop.	Death Rate/ 10,000 Registered Vehicles
1947	1,052	563	N/A	26	N/A	N/A
1948	1,351	671	N/A	19	N/A	5.34
1949	1,745	738	N/A	29	N/A	N/A
1950	2,304	760	N/A	12	N/A	2.55
1951	3,421	815	4.0	26	12.9	5.13
1952	4,219	1,174	5.6	26	12.4	4.71
1953	4,114	1,322	6.1	17	7.8	2.84
1954[a]	4,787	1,304	5.8	17	7.6	2.71
1955	6,691	1,618	7.2	15	6.6	2.22
1956	7,528	1,570	6.7	25	10.7	3.57
1957	7,978	1,703	7.0	25	10.3	3.46
1958	6,898	1,573	6.2	21	8.4	2.77
1959	7,189	1,671	6.5	18	6.9	2.24
1960	7,763	1,871	7.1	21	7.9	2.54
1961[a]	7,547	2,311	8.7	19	7.1	2.22
1962	8,338	2,542	9.5	32	11.9	3.82
1963	9,554	3,075	11.6	27	10.2	3.03

1964	9,948	3,305	11.9	32	11.5	3.43	
1965	10,783	3,824	13.4	27	9.5	2.64	
1966	9,950	3,746	12.6	28	9.8	2.60	
1967	9,106	3,484	12.2	39	13.7	3.63	
1968	8,983	3,573	12.8	22	7.9	1.89	
1969	9,589	3,768	12.7	19	6.4	1.64	
1970(a)	6,759	3,717	12.3	23	7.5	2.00	
1971	7,314	3,876	12.5	23	7.0	1.91	
1972	8,065	4,055	13.5	46	15.3	3.42	(b)
1973	8,499	4,951	15.5	23	7.2	1.63	
1974(c)	9,599	4,678	11.9	31	7.9	2.00	(b)
1975	9,354	4,474	11.2	26	6.5	1.60	(b)
1976	9,146	3,811	9.3	29	7.1	1.78	(b)
1977	10,011	4,513	11.0	34	8.3	2.00	(b)
1978(a)	8,636	4,635	11.4	47	11.6	N/A	
1979	8,798	4,923	12.1	42	10.3	N/A	
1980	8,305	4,800	11.7	33	8.0	N/A	

(a) Collision reporting criteria changed (See Page 4).

(b) Registration estimated from total Ontario registrations.

(c) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit 1-6

PEDESTRIAN AND CYCLIST INJURIES
HISTORIC TRENDS

YEAR	PEDESTRIAN		BICYCLIST	
	Injuries	Fatalities	Injuries	Fatalities
1947	141	21	N/A	N/A
1948	204	13	N/A	N/A
1949	271	18	43	0
1950	239	11	69	1
1951	284	15	89	0
1952	448	13	116	1
1953	464	9	113	1
1954	439	13	129	1
1955	517	7	141	1
1956	447	21	123	1
1957	526	15	124	2
1958	446	14	100	2
1959	456	13	120	1
1960	422	13	120	2
1961	522	11	112	1
1962	495	13	126	1
1963	558	15	120	1
1964	526	20	120	0
1965	582	17	140	0
1966	618	17	132	1
1967	537	17	113	0
1968	588	10	84	1
1969	602	6	91	2
1970	586	14	101	1
1971	570	13	155	2
1972	530	21	156	2
1973	569	9	197	1
1974(a)	555	13	192	3
1975	513	11	235	0
1976	480	14	195	0
1977	503	10	193	3
1978	542	25	162	1
1979	464	15	177	4
1980	434	12	178	1

(a) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Chapter Two
Collisions

General

In 1980, 8,305 collisions were reported to the Hamilton-Wentworth Regional Police Department. It was determined that, in general, the number of collisions per thousand population decreased with area municipality size (Exhibit 2-1).

Injuries

Of the 23,806 persons involved in collisions, 4,833 received injuries. The chance of an involved person sustaining an injury in a collision varied from a 17 percent chance for a motor vehicle rider or passenger to a 100 percent chance for a pedestrian (Exhibit 2-2). Although the risk of injury would appear to be significantly higher for motorcyclists, bicyclists and pedestrians, this phenomena is partially or wholly explained by the reporting criteria. It is unlikely that a cyclist or pedestrian would be involved in a collision that resulted in over $400.00 damage without the cyclist or pedestrian being injured. Small or exposed vehicles such as bicycles also afford less protection in a collision.

Seatbelts

Although motor vehicle seatbelts were reported as being in use for over 87 percent of involved drivers (Exhibit 2-3), field observations taken by the Province of Ontario in 1978 (2.1) suggest an actual usage rate for drivers in the order of 65 percent. This discrepancy could be interpreted to mean that a higher proportion of seatbelt users were involved in collisions, but is more likely to indicate an over-statement of seatbelt usage by persons involved in collisions. The involved individual may be concerned about receiving a summons for failure to wear his or her seatbelt or may be concerned about additional financial or civil responsibilities caused by failure to wear belts at the time of the collisions.

It is estimated that in Hamilton-Wentworth in 1980, 1,650 persons would have received less severe injuries had they been wearing their seatbelts. Ontario statistics (2.2) indicate increased medical and hospital costs for unbelted persons involved in collisions. If applied to Hamilton-Wentworth in 1979, unbelted persons involved in collisions would have been responsible for extra costs of $300,000.00. These costs do not include injuries that may have been entirely prevented had seatbelts been worn.

Damages

Total damages in collisions in Hamilton-Wentworth amounted to a sum in excess of 13 million dollars (Exhibit 2-4), which includes damage to vehicles and property

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but does not include medical and hospital expenses, loss of income, or loss of future earnings. The average direct cost of each collision was $1,651.00 with 45 percent of the vehicles involved sustaining damage in excess of $600.00 (Exhibit 2-5).

Times of Occurrence

A close similarity between the occurrence of collisions and traffic volumes, on a time of day basis, (Exhibit 2-6), was observed. However, the collision rate (in terms of traffic volume) was greater than the daily average during the period from midnight to 5 a.m., when 931 or 11.2 percent of the collisions occurred.

The pattern of collision occurrences by time of day and day of week was summarized (Exhibit 2-7) and a difference was found between the pattern of collisions by hour of day and by day of week (Exhibit 2-7 and Exhibit 2-8).

The explanation for variations in patterns of collisions by time of day and day of week may be associated with factors which change during the week such as the frequency of shopping or personal trips, or different drinking and stress patterns that might influence collision involvement.

The pattern of collision occurrences was compared on a month of year basis (Exhibit 2-9) and there was a difference between the number of collisions which occurred each month. The higher number of collisions occurring during the winter months is probably primarily due to drivers not adjusting to adverse weather and roadway conditions.

Impact Types

The type of initial impact was compared with the injury classification of the collisions (Exhibit 2-10) and it was determined (at the 95 percent level) that the probability of injury was not the same for all initial impact types.

The chance of being injured in an approaching or single motor vehicle collision was 51 to 53 percent compared to a 22 to 44 percent chance for other collision types. However, approaching and single motor vehicle collisions resulted in fewer overall injuries (793 versus 2,493) when compared with other collision types.

REFERENCES

2.1 Based on surveys conducted by the Ministry of Transportation and Communications of Ontario, July 1978.

2.2 Ontario Ministry of Health: The cost of hospital and medical treatment for a person injured while wearing seatbelts is $282; for those not wearing belts, $419.

Exhibit 2-1 **COLLISIONS VS AREA MUNICIPALITY**

Municipality	Class of Collision (a) Fatal	Non-Fatal Injury	Property Damage Only	All Collisions	1980 Collision Rate per 1,000 Pop.
Ancaster	4	79	119	202	12.5
Dundas	1	101	156	258	18.0
Flamborough	3	115	163	281	12.3
Glanbrook	0	48	48	96	12.3
City of Hamilton	22	2,653	4,177	6,852	23.6
Stoney Creek	3	257	356	616	18.5
Total for the Regional Municipality of Hamilton-Wentworth	33	3,253	5,019	8,305	20.2

COLLISION RATE IN TERMS OF COLLISIONS PER 1,000 POPULATION GENERALLY INCREASED WITH INCREASED MUNICIPALITY SIZE.

(a) Collisions reported to the Hamilton-Wentworth Regional Police, areas patrolled by the Provincial Police (e.g. Kings Highways) not included.

Exhibit 2-2 **INJURY STATUS OF ALL PERSONS INVOLVED**

Category	Persons Involved	Persons Injured	Injuries/ Involved	TYPE OF INJURY Fatal	Major	Minor	Minimal
Driver	13,932	2,365	0.17	5	151	852	1,357
Motorcyclist(a)	189	172	0.91	6	20	104	42
Bicyclist	181	178	0.98	1	16	81	80
Rider/Passenger	9,058	1,672	0.18	9	100	620	943
Pedestrian	446	446	1.00	12	62	198	174
Totals	23,806	4,833	0.20	33	349	1,855	2,596

THERE WERE 2 CHANCES IN 10 THAT A PERSON INVOLVED IN A TRAFFIC COLLISION WOULD BE INJURED.

(a) Motorcycle drivers only.

Exhibit 2-3

DRIVER INJURY STATUS VS SAFETY EQUIPMENT IN USE

Driver Injury Status	SAFETY EQUIPMENT IN USE				
	All	Pelvic Only	None	Unknown	Total
None	9,914	596	708	379	11,597
Minimal	1,835	128	293	87	2,343
Minor	1,105	63	297	108	1,573
Major	108	6	85	71	270
Fatal	8	-	5	7	20
Total	12,970	793	1,388	652	15,803

DRIVERS WHOSE SEAT BELT USAGE WAS RECORDED	15,803
TOTAL DRIVERS WEARING PELVIC AND/OR SHOULDER BELTS	13,763
RECORDED DRIVER BELT USAGE	87.1%

THE REPORTED SEAT BELT USAGE RATE FOR DRIVERS INVOLVED IN COLLISIONS WAS 87.1%

Exhibit 2-4 **PROPERTY DAMAGE ESTIMATES (a)**

	Total	Average per Collision
Damage to Vehicles	$13,126,000.	$1,581.
Damage to Other Property	582,000.	70.
All Damage	13,708,000.	1,651.

THE AVERAGE DAMAGE FOR EACH REPORTED COLLISION WAS $1,651.

Exhibit 2-5 **ESTIMATED DAMAGE TO MOTOR VEHICLES (a)**

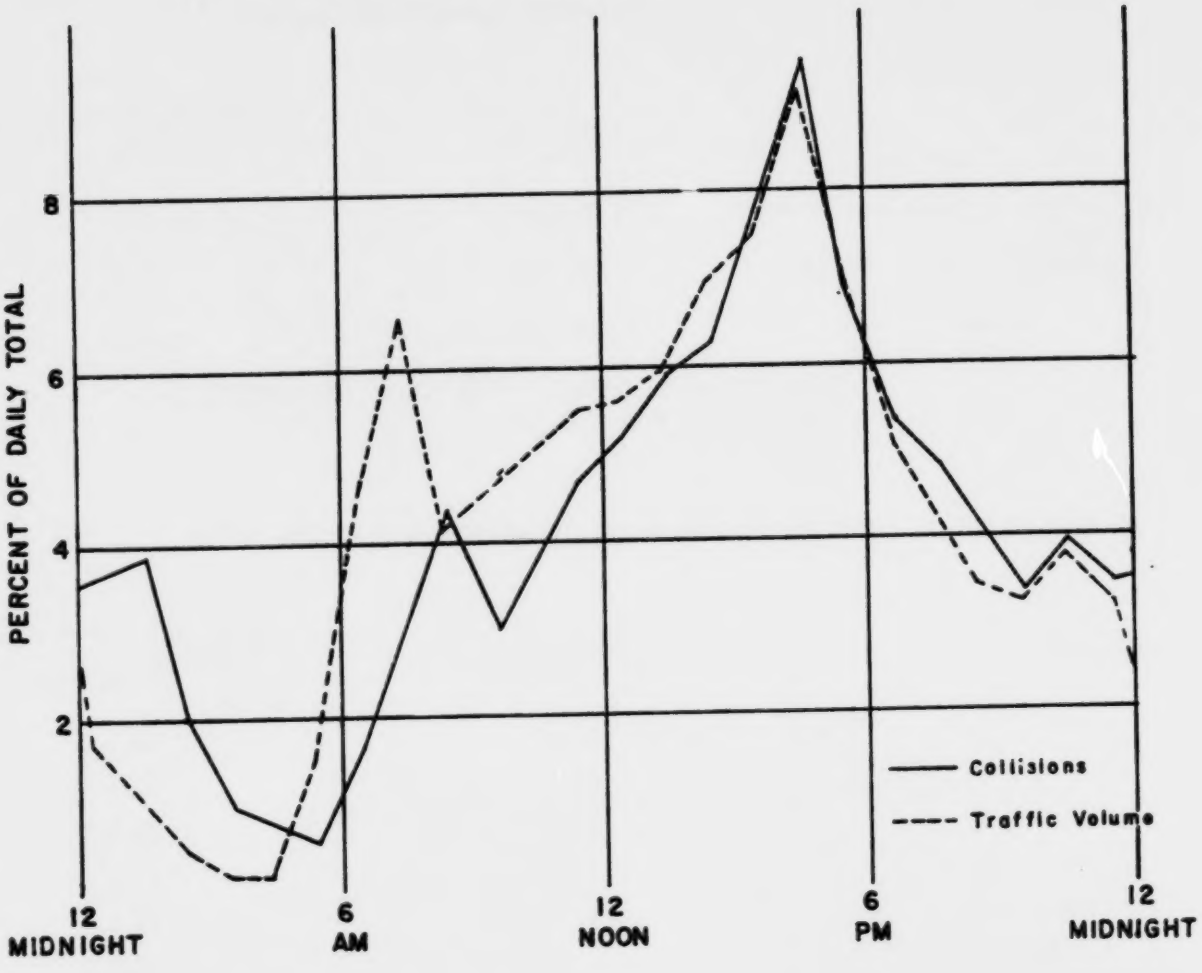
Damage	No. of Vehicles	% Of All Vehicles Involved
None	1,597	10.1
$0 - 199	1,608	10.1
$200 - 399	2,157	13.6
$400 - 599	2,784	17.5
$600 - 999	2,939	18.5
$1,000 - 1,999	2,985	18.8
$2,000 - 3,999	1,491	9.4
$4,000 and over	311	2.0
	15,872	100.0

OVER 45% OF THE VEHICLES INVOLVED IN COLLISIONS EXPERIENCED DAMAGE IN EXCESS OF $600.

(a) As estimated at the scene of the collision.

Exhibit 2-6

TIME OF DAY VS COLLISIONS AND TRAFFIC VOLUME



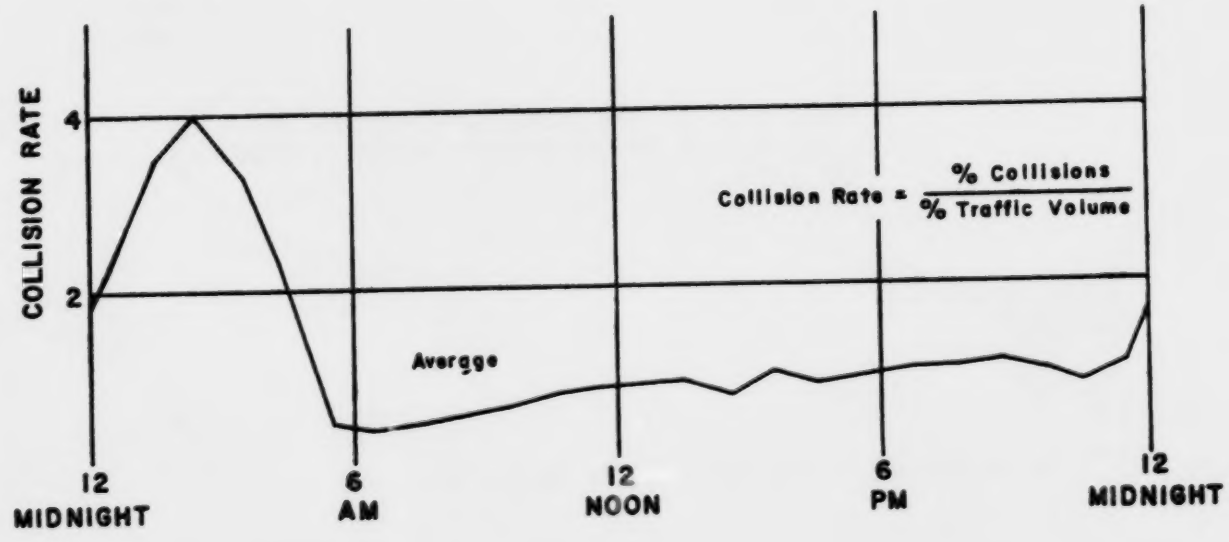


Exhibit 2-7

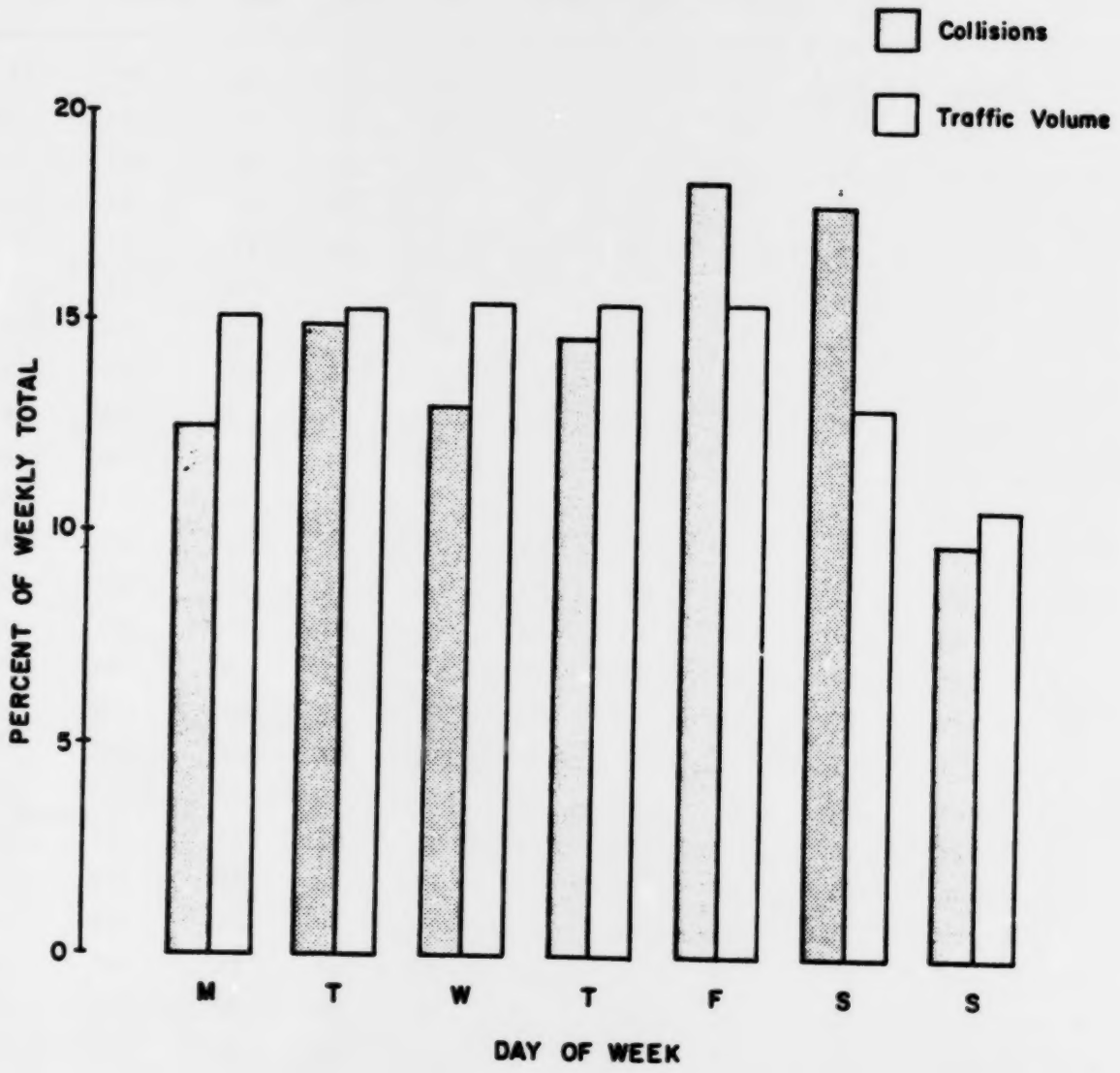
COLLISION OCCURRENCES BY TIME OF DAY AND DAY OF WEEK

Time	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTALS	(%)
12 - 1 a.m.	18	34	33	37	43	87	55	307	(3.7)
1 - 2 a.m.	3	33	33	31	53	89	81	323	(3.9)
2 - 3 a.m.	5	16	7	19	13	54	48	162	(2.0)
3 - 4 a.m.	4	11	8	9	6	29	17	84	(1.0)
4 - 5 a.m.	1	2	1	4	8	24	15	55	(0.7)
5 - 6 a.m.	5	9	5	2	7	12	8	48	(0.6)
6 - 7 a.m.	8	26	25	20	22	21	12	144	(1.7)
7 - 8 a.m.	39	49	50	47	65	25	12	287	(3.5)
8 - 9 a.m.	84	77	58	53	60	31	3	366	(4.4)
9 - 10 a.m.	36	50	44	28	40	44	14	256	(3.1)
10 - 11 a.m.	55	60	33	49	59	59	17	332	(4.0)
11 - 12 noon	48	73	57	55	53	81	24	391	(4.7)
12 - 1 p.m.	51	63	54	70	74	82	35	429	(5.2)
1 - 2 p.m.	61	65	67	84	83	94	37	491	(5.9)
2 - 3 p.m.	54	74	77	77	98	91	49	520	(6.3)
3 - 4 p.m.	97	98	92	94	122	99	46	648	(7.8)
4 - 5 p.m.	127	136	99	125	156	107	43	793	(9.5)
5 - 6 p.m.	81	77	80	92	116	86	47	579	(7.0)
6 - 7 p.m.	59	70	45	45	95	81	53	448	(5.4)
7 - 8 p.m.	51	57	62	66	77	53	36	402	(4.8)
8 - 9 p.m.	35	33	30	50	81	57	54	340	(4.1)
9 - 10 p.m.	28	31	41	45	56	48	33	282	(3.4)
10 - 11 p.m.	38	41	45	62	53	50	39	328	(3.9)
11 - 12 a.m.	30	32	25	39	71	68	25	290	(3.5)
Totals	1,028	1,217	1,071	1,203	1,511	1,472	803	8,305	(100.0)
%	(12.4)	(14.7)	(12.9)	(14.5)	(18.2)	(17.7)	(9.7)		

THE HIGHEST ONE HOUR COLLISION PERIOD WAS FRIDAYS BETWEEN 4 P.M. AND 5 P.M.

Exhibit 2-8

DAY OF WEEK VS COLLISIONS AND TRAFFIC VOLUME



THE HIGHEST COLLISION RATE (a)
OCCURRED ON SATURDAYS

(a) RATE = $\frac{\%\ \text{COLLISIONS}}{\%\ \text{VOLUME}}$

Exhibit 2-9

MONTH OF YEAR OF OCCURRENCE OF COLLISIONS

Month	Number of Collisions	Percentage of Total Collisions
January	534	6.4
February	677	8.2
March	650	7.8
April	639	7.7
May	654	7.9
June	668	8.0
July	637	7.7
August	607	7.3
September	714	8.6
October	832	10.0
November	794	9.6
December	899	10.8
	8,305	100.0

THE HIGHEST NUMBER OF COLLISIONS OCCURRED IN THE MONTH OF DECEMBER.

Exhibit 2-10

INITIAL IMPACT TYPE VS CLASSIFICATION

Initial Impact Type	Classification A Fatal Injury		B Non-Fatal Injury		C Property Damage Only		D All Collisions		Column A + B / Column D
Rear End	2	(6.1)	820	(25.2)	1,048	(20.9)	1,870	(22.5)	0.44
Angle	9	(27.3)	1,003	(30.8)	1,693	(33.7)	2,705	(32.6)	0.37
Turning	2	(6.1)	340	(10.5)	710	(14.1)	1,052	(12.7)	0.33
Sideswipe	2	(6.1)	228	(7.0)	796	(15.9)	1,026	(12.4)	0.22
Approaching	9	(27.3)	394	(12.1)	353	(7.0)	756	(9.1)	0.53
Single Motor Vehicle	5	(15.2)	385	(11.8)	377	(7.5)	767	(9.2)	0.51
Other	4	(12.1)	83	(2.6)	42	(0.8)	129	(1.6)	0.57
	33	(100.0)	3,253	(100.0)	5,019	(100.0)	8,305	(100.0)	

55% OF THE INTITIAL IMPACTS RECORDED WERE "ANGLE" OR "REAR END".

THE PROBABILITY OF FATALITY OF INJURY WAS HIGHEST IN APPROACHING OR SINGLE VEHICLE COLLISIONS

Chapter Three
Drivers

Driver Age

Although sixteen to nineteen year olds make up only 7 percent of the licenced driving population, this age group was involved in 14.8 percent of reported collisions (Exhibit 3-1).

Furthermore, the involvement rate for the younger age groups may prove to be even higher if measured in terms of vehicle-miles driven. Younger drivers may be less likely to own their vehicle, less likely to require or use a vehicle for work trips and less likely to drive extended distances.

Drivers under 20 involved in collisions were less likely to have been driving properly at the time of the collision (Exhibit 3-2). Younger drivers involved in collisions were more likely to have committed improper driving actions resulting from poor judgement or lack of maturity. Frequent improper driver actions for this age group were "speed too fast", "loss of control of the vehicle", "failure to yield the right-of-way" and "following too close". Drivers over 65 years of age involved in collisions were more likely to have committed infractions involving non-compliance with traffic regulations such as "failure to yield the right-of-way" or "improper turn".

Drinking Drivers

Drinking drivers were involved in 11 percent of the reported collisions, 33.3 percent of the fatal and 15.1 percent of the injury collisions (Exhibit 3-3). There was a 30 percent greater chance of an injury occurring in a collision which involved a driver who had been drinking.

Exhibit 3-4 indicates that 39 percent of the collisions which occurred during the period from 10 p.m. to 3 a.m. from Wednesdays to Sundays involved drinking drivers.

Exhibit 3-5 indicates that less than 20 percent of the drivers involved in collisions who had been drinking or were impaired were driving properly at the time of the collision and the most frequently indicated improper driver action was loss of control of the vehicle.

Driver age groups from 16 to 54 had similar percentages of drivers who were impaired or who had been drinking (Exhibit 3-6).

Hit and Run Collisions

In 1980 there were 982 hit and run collisions involving 984 hit and run drivers of which 38 percent were subsequently apprehended (Exhibit 3-7). Although the hit and run collision is more likely to be of a "property damage only" classification as opposed to other collisions (Exhibit 3-8), the hit and run driver is attempting to escape responsibility

for his actions and this is of particular concern when a personal injury or fatality is involved. The hit and run driver may also be involved with other driving infractions at the time of the collision such as impaired driving or failure to have an operator's permit.

Non-Licenced Drivers

It was determined that the non-licenced driver, including those whose licence was under suspension, was more likely to be involved in a fatal or injury collision (Exhibit 3-9) and also more likely to be under the influence of alcohol at the time of the collision (Exhibit 3-10). The non-licenced driver was also more likely to have been driving too fast for roadway conditions or to have lost control of the vehicle at the time of the collision (Exhibit 3-11).

Exhibit 3-12 indicates that 60 percent of the collisions involving a non-licenced driver occurred between 6 p.m. and 5 a.m. whereas only 39 percent of collisions occurred during this period. The exhibit also indicates that 79 percent of the alcohol-related collisions occurred during this period. The 6 p.m. to 5 a.m. period is characterized by high alcohol involvement, high involvement of non-licenced drivers and high collision involvement rate.

Moving Violations

The Regional Police Department issued over 40,000 moving violation summonses in 1980 and this effort at reducing traffic collisions by selective enforcement is recognized. However, it was determined that, in many cases, enforcement was directed at violations that do not relate proportionately to violations indicated in traffic collisions. This could indicate that the enforcement effort is very successful in that it eliminates collisions of related types. However, this may be an indication that a portion of the enforcement effort is directed at moving violations that are readily enforceable (Exhibit 3-13). It is recognized that some violations involved in collisions are difficult to enforce or represent an unfeasible countermeasure to collision occurrences. For example, "following too close" was indicated in 18.6 percent of the improper driving actions and "failure to yield the right-of-way" was indicated in 25.6 percent of improper driving actions. The former is difficult to enforce in the absence of a collision, and it is unfeasible to enforce the latter. Selective enforcement nonetheless is a recognized collision countermeasure technique for other types of moving violations.

Motorcycles

The proportion of motorcycle drivers involved in collisions driving properly in most age groups is higher than the proportion for all other motor vehicle drivers for the same age groups (Exhibit 3-14). This exhibit also indicates that the most frequent improper driver action for motorcyclists was "lost control". Exhibit 3-15 indicates that 91 percent of motorcyclists involved in reportable collisions were injured.

Without more refined data on exposure of motorcyclists in traffic under non-collision circumstances, the significance of a higher proportion of involved motorcycle drivers driving properly in a collision cannot be specifically determined. It could be hypothesized that a motorcycle operator is particularly prone to being involved in a collision when driving properly or alternatively, that the motorcycle operator is particularly adept in avoiding a collision for which he or she would have been responsible.

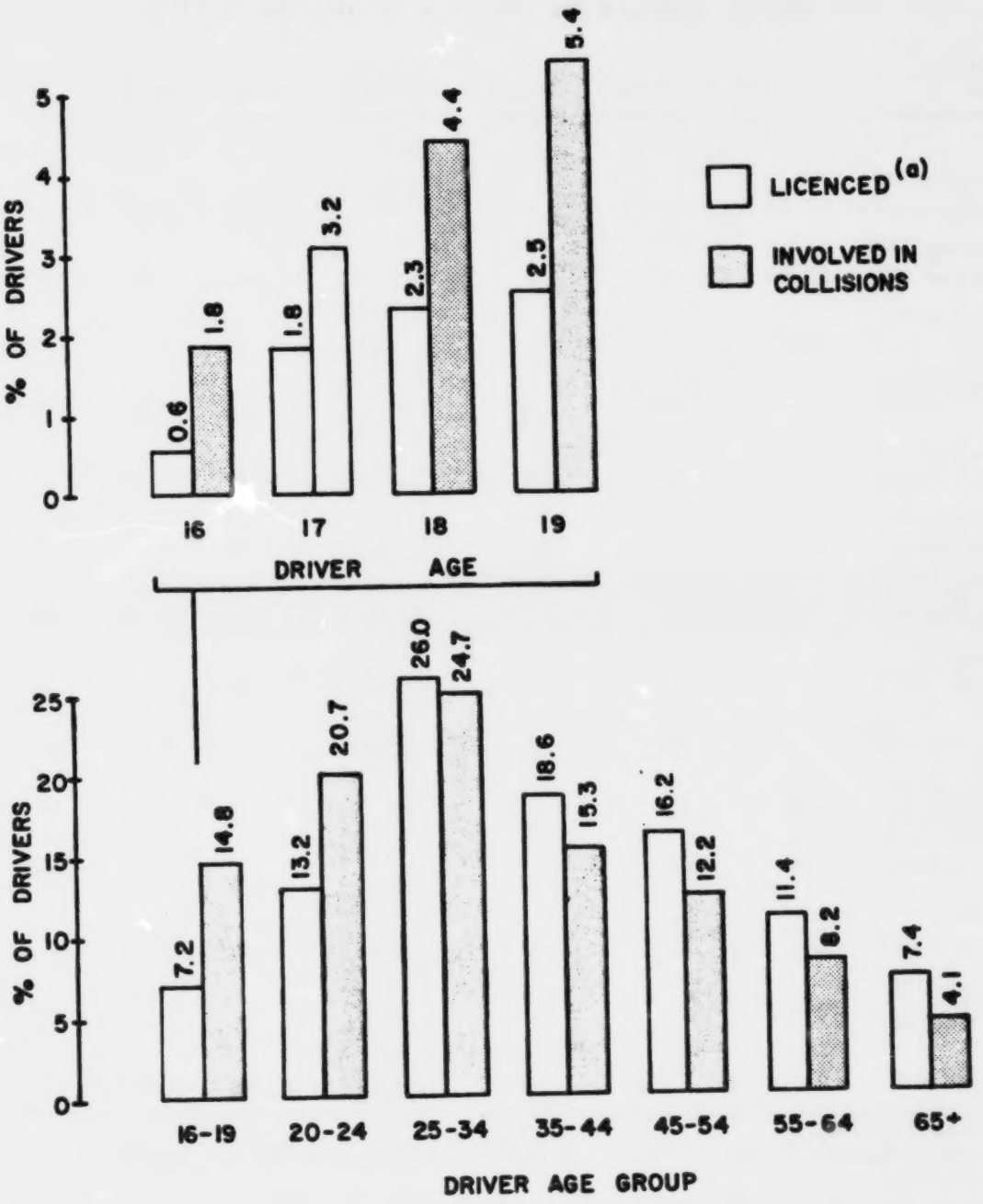
It was determined from the collision reports that only 60 percent of the motorcycle drivers involved in collisions were reported as wearing safety helmets as required by the Ontario legislation (Exhibit 3-16).

Bicycles

It was determined that responsibility for a collision involving a bicyclist decreased with increased bicyclist age and that 40 percent or less of bicyclists under 15 involved in collisions were recorded as driving properly (Exhibit 3-17). The most predominant known cyclist improper action indicated was "failure to yield the right-of-way" but instances of disobeying other traffic laws were also prominent.

Exhibit 3-1

LICENCED MOTOR VEHICLE DRIVER AGE VS COLLISION INVOLVEMENT



16 TO 19 YEAR OLD DRIVERS WERE INVOLVED IN MORE COLLISIONS PER LICENCED DRIVER THAN ANY OTHER AGE GROUP.

(a) Licenced in the Province of Ontario.

Exhibit 3-2

MOTOR VEHICLE DRIVER AGE VS DRIVER ACTION

Driver Action	0-4	5-9	10-14	15-19	20-24	25-34
Driving Properly	2	-	1	777	1,365	1,869
Following Too Close	-	-	-	199	253	257
Speed Too Fast	-	-	-	112	83	47
Improper Turn	-	-	2	91	135	160
Disobey Traffic Signal	-	-	1	75	80	94
Disobey Stop Sign	-	-	-	47	64	64
Fail to Yield R.O.W.	2	-	1	183	268	326
Improper Passing	-	-	-	21	21	25
Lost Control	-	-	5	247	214	167
Wrong Way One-Way Street	-	-	-	4	7	10
Not Known	-	-	1	125	178	196
Other	1	-	-	206	231	255
Disobey Other Control	-	-	-	12	15	13
Totals	5	0	11	2,099	2,914	3,485
% Drivers involved driving properly(b)	50	-	10.0	49.1	54.5	61.6

(a) Note - 1 age not stated.
(b) Excluding "Not Known" and "Other".
(c) Twenty-one non-licenced drivers between the ages of 13 and 15 included.
Nine non-licenced drivers between the ages of 15 and 16 included.

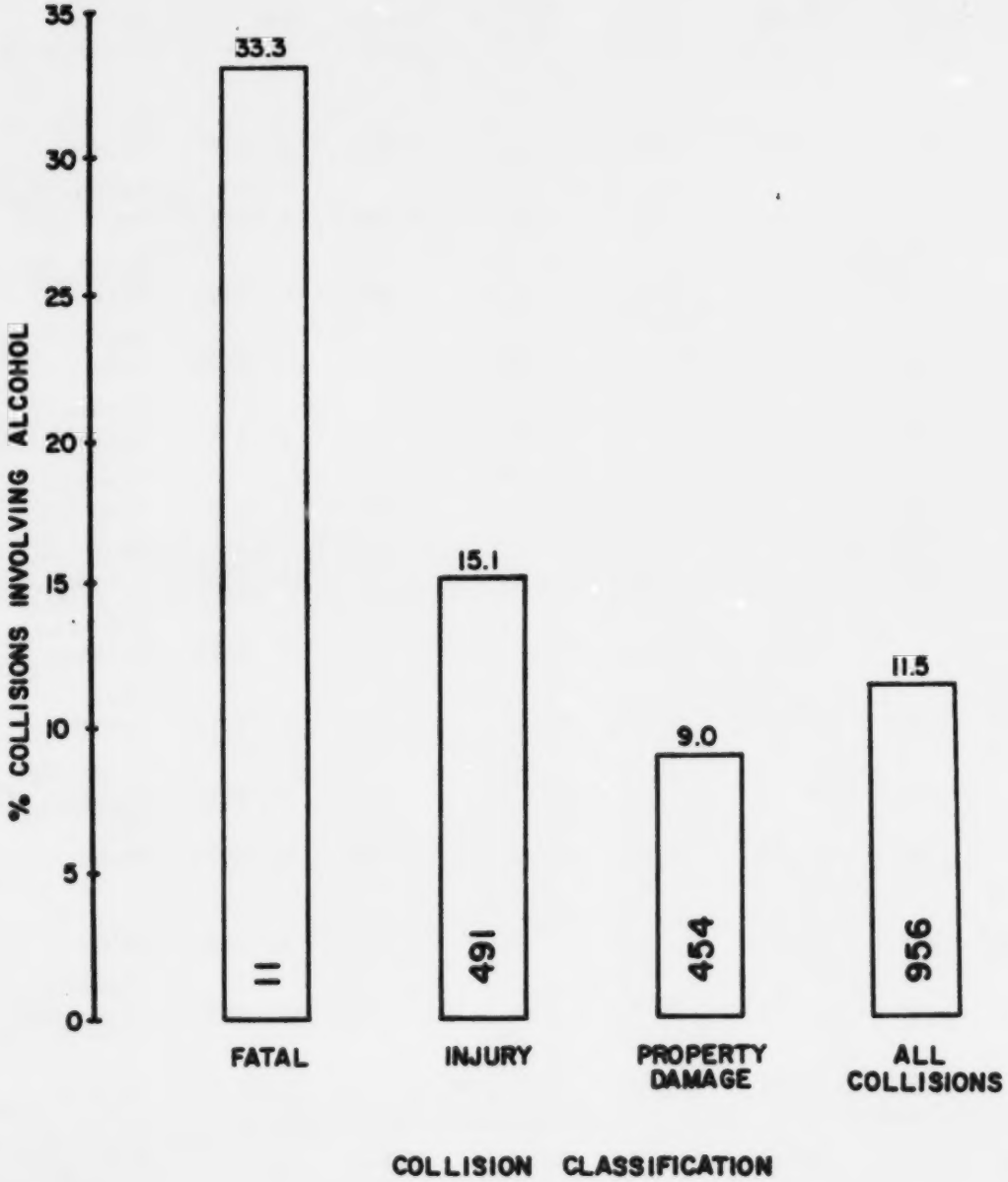
35-44	45-54	55-64	65-74	75 +.	Totals	(%)	Driver Action
1,166	895	575	189	44	6,883	(48.7)	Driving Properly
133	113	59	25	2	1,041	(7.4)	Following Too Close
25	8	12	1	1	289	(2.0)	Speed Too Fast
130	103	80	52	15	770	(5.5)	Improper Turn
66	75	50	17	5	463	(3.3)	Disobey Traffic Signal
29	32	16	12	7	271	(1.9)	Disobey Stop Sign
214	188	162	62	23	1,429	(10.1)	Fail to Yield R.O.W.
10	17	10	1	-	105	(0.7)	Improper Passing
103	64	39	12	5	856	(6.1)	Lost Control
2	3	1	1	1	29	(0.2)	Wrong Way One-Way Street
109	99	59	29	4	800	(5.7)	Not Known
155	122	82	49	14	1,115	(7.9)	Other
13	6	6	5	-	70	(0.5)	Disobey Other Control
2,155	1,725	1,151	455	121	14,121[a]	(100.0)	Totals
61.7	59.5	56.9	50.1	42.7	56.4		% Drivers involved driving properly[b]

THE OVERALL PERCENTAGE OF DRIVERS DRIVING PROPERLY WAS 56.4%. THE PERCENTAGE OF DRIVERS DRIVING PROPERLY FOR DRIVER AGE GROUPS UNDER 20 AND OVER 74 WAS LESS THAN 50%.

THE MOST FREQUENT RECORDED IMPROPER DRIVING ACTION WAS FAILING TO YIELD RIGHT-OF-WAY.

Exhibit 3-3

ALCOHOL INVOLVEMENT VS COLLISION CLASSIFICATION



A HIGHER PROPORTION OF INJURY COLLISIONS INVOLVED ALCOHOL

Exhibit 3-4

TIME OF DAY AND DAY OF WEEK OF COLLISIONS INVOLVING ALCOHOL

Time of Day	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL
12 - 1 a.m.	2	12	14	17	13	26	14	98
1 - 2 a.m.	-	11	12	19	29	33	44	148
2 - 3 a.m.	2	7	4	5	7	18	19	62
3 - 4 a.m.	-	6	3	3	3	12	7	34
4 - 5 a.m.	1	-	-	1	2	11	7	22
5 - 6 a.m.	-	1	-	-	-	1	2	4
6 - 7 a.m.	-	-	-	1	-	4	1	6
7 - 8 a.m.	-	-	2	-	1	-	4	7
8 - 9 a.m.	-	1	-	1	-	3	-	5
9 - 10 a.m.	1	-	-	1	-	1	-	3
10 - 11 a.m.	2	1	-	6	2	-	1	12
11 - 12 noon	1	-	1	-	2	-	-	4
12 - 1 p.m.	1	1	3	5	2	1	3	16
1 - 2 p.m.	-	1	1	-	1	2	1	6
2 - 3 p.m.	1	4	5	2	7	3	2	24
3 - 4 p.m.	3	1	4	3	7	4	6	28
4 - 5 p.m.	-	3	4	3	6	15	5	36
5 - 6 p.m.	8	2	1	7	3	13	7	41
6 - 7 p.m.	4	3	6	7	7	13	14	54
7 - 8 p.m.	3	10	7	6	4	15	1	56
8 - 9 p.m.	2	5	6	7	15	18	7	60
9 - 10 p.m.	10	6	7	9	15	8	9	64
10 - 11 p.m.	8	4	15	12	10	8	7	64
11 - 12 midnight	7	7	3	9	24	19	6	75
Totals	56	86	98	124	170	228	167	929

39% OF THE COLLISIONS WHICH OCCURRED DURING THE PERIOD FROM 10:00 P.M. TO 3:00 A.M., WEDNESDAYS TO SUNDAYS INVOLVED ALCOHOL.

8% OF ALL ALCOHOL RELATED COLLISIONS OCCURRED BETWEEN 1:00 A.M. AND 2:00 A.M. ON SATURDAYS AND SUNDAYS.

Exhibit 3-5

DRIVER ACTION VS DRIVER CONDITION

	Normal	Had Been Drinking	Impaired-Alcohol	Impaired-Drugs	Fatigue
Driving Properly	6,696	94	3	-	-
Following Too Close	957	37	23	-	-
Speed Too Fast	173	70	18	1	-
Improper Turn	711	30	8	-	1
Disobey Traffic Signal	397	31	22	-	-
Disobey Stop Sign	241	14	7	-	-
Fail to Yield Right-of-Way	1,336	39	11	-	-
Improper Passing	87	10	1	-	-
Lost Control	526	140	94	5	7
Wrong Way on One-Way Street	19	4	4	-	-
Not Known	464	60	27	-	2
Other	849	84	112	4	5
Disobey Other Control	57	8	2	-	-
Totals	12,513	621	332	10	15
% Drivers involved driving properly(a)	59.8	19.7	1.6	0.0	0.0

(a) Excluding not known and other.

Medical Defect	Not Known	Other	Totals	(%)	
2	87	2	6,884	(48.7)	Driving Properly
2	21	1	1,041	(7.4)	Following Too Close
-	27	1	289	(2.0)	Speed Too Fast
1	16	3	770	(5.5)	Improper Turn
1	11	1	463	(3.3)	Disobey Traffic Signal
-	8	1	271	(1.9)	Disobey Stop Sign
3	40	-	1,429	(10.1)	Fail to Yield Right-of-Way
-	7	-	105	(0.7)	Improper Passing
8	73	3	856	(6.1)	Lost Control
-	2	-	29	(0.2)	Wrong Way on One-Way Street
3	244	-	800	(6.7)	Not Known
7	53	1	1,115	(7.9)	Other
-	3	-	70	(0.5)	Disobey Other Control
27	592	12	14,122	(100.0)	Totals
11.8	-	-	56.4		% Drivers involved driving properly

LESS THAN 20 % OF DRIVERS WHO HAD BEEN DRINKING OR WERE IMPAIRED WERE RECORDED AS DRIVING PROPERLY AT THE TIME OF THE COLLISION.

Exhibit 3-6

MOTOR VEHICLE DRIVER AGE VS DRIVER CONDITION

Driver Condition	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34
Normal	4	-	5	1,836	2,501	3,072
Had Been Drinking	1	-	1	112	188	171
Impaired - Alcohol	-	-	1	33	77	82
Impaired - Drugs	-	-	-	-	3	3
Fatigue	-	-	-	5	5	3
Medical Defect	-	-	-	5	3	4
Not Known	-	1	3	105	132	150
Other	-	-	1	3	4	-
Totals	5	1	11	2,099	2,913	3,485
% Drinking Drivers Involved (Excluding Not Known and Other)	20.0	0.0	28.6	7.2	9.5	7.6

(a) One driver age not stated.

35 - 44	45 - 54	55 - 64	65 - 74	75 +	Total	(%)	Driver Condition
1,944	1,552	1,068	413	117	12,512	(88.6)	Normal
70	49	22	7	-	621	(4.4)	Had Been Drinking
56	53	23	7	-	332	(2.4)	Impaired - Alcohol
-	4	-	-	-	10	(0.1)	Impaired - Drugs
1	1	-	-	-	15	(0.1)	Fatigue
3	5	2	4	1	27	(0.2)	Medical Defect
81	60	33	23	3	591	(4.2)	Not Known
-	-	3	1	-	12	(0.1)	Other
2,155	1,724	1,151	455	121	14,120[a]	(100.0)	Totals
6.1	6.1	4.0	3.2	0.8	7.1		% Drinking Drivers Involved (Excluding Not Known and Other)

6.8% OF ALL DRIVERS INVOLVED HAD BEEN DRINKING OR WERE IMPAIRED BY ALCOHOL AT THE TIME OF THE COLLISION.

15 TO 55 YEAR OLD DRIVERS HAD APPROXIMATELY THE SAME LIKELIHOOD OF BEING UNDER THE INFLUENCE OF ALCOHOL AT THE TIME OF A COLLISION.

Exhibit 3-7

HIT AND RUN COLLISIONS

HIT AND RUN COLLISIONS	982	
HIT AND RUN DRIVERS (a)	984	
DRIVERS APPREHENDED	371	38%

38% OF HIT AND RUN DRIVERS WERE SUBSEQUENTLY APPREHENDED.

Exhibit 3-8

HIT AND RUN COLLISION CLASSIFICATION

COLLISIONS IN WHICH:	FATAL	INJURY	PROPERTY DAMAGE	TOTAL
Driver(s) Apprehended	1	124	246	371
Driver(s) Not Apprehended	1	123	487	611
TOTAL	2 (0.2%)	247 (25.2%)	733 (74.6%)	982 (100.0%)

74.6% OF HIT AND RUN COLLISIONS INVOLVED PROPERTY DAMAGE ONLY.

(a) Some collisions involved more than one hit and run driver.

Exhibit 3-9

LICENCE STATUS OF MOTOR VEHICLE DRIVERS VS CLASSIFICATION OF COLLISION

Classification	Non-Licenced No.	(% of Non-Licenced)	Licenced No.	(% of Licenced)
Fatal	2	(0.9)	50	(0.4)
Injury	108	(46.6)	5,444	(39.2)
Property Damage	122	(52.6)	8,396	(60.4)
Total	232	(100.0)	13,890	(100.0)

A HIGHER PROBABILITY OF A FATAL OR INJURY COLLISION IS ASSOCIATED WITH THE INVOLVEMENT OF A NON-LICENCED DRIVER IN A COLLISION.

Exhibit 3-10

LICENCE STATUS OF MOTOR VEHICLE DRIVERS VS DRIVER CONDITION

Driver Condition	Non-Licenced No.	(% of Non-Licenced)	Licenced No.	(% of Licenced)
Normal	121	(52.2)	12,392	(89.2)
Had Been Drinking	32	(13.8)	589	(4.2)
Impaired - Alcohol	26	(11.2)	306	(2.2)
Impaired - Drugs	-	(-)	10	(0.1)
Fatigue	-	(-)	15	(0.1)
Medical Defect	4	(1.7)	23	(0.2)
Not Known	46	(19.8)	546	(3.9)
Other	3	(1.3)	9	(0.1)
Total	232	(100.0)	13,890	(100.0)

A HIGHER PROBABILITY OF ALCOHOL USE WAS ASSOCIATED WITH THE INVOLVEMENT OF A NON-LICENCED DRIVER IN A COLLISION.

Exhibit 3-11
LICENCE STATUS OF MOTOR VEHICLE DRIVER VS DRIVER ACTION

Driver Action	Non-Licenced No.	(% of Non-Licenced)	Licenced No.	(% of Licenced)
Driving Properly	41	(17.7)	6,843	(49.3)
Following Too Close	11	(4.7)	1,030	(7.4)
Speed Too Fast	22	(9.5)	267	(1.9)
Improper Turn	8	(3.4)	762	(5.5)
Disobey Traffic Signal	8	(3.4)	455	(3.3)
Disobey Stop Sign	10	(4.3)	261	(1.9)
Fail to Yield R.O.W.	19	(8.2)	1,410	(10.2)
Improper Passing	2	(0.9)	103	(0.7)
Lost Control	42	(18.1)	814	(5.9)
Wrong Way on One Way Street	3	(1.3)	26	(0.2)
Not Known	30	(12.9)	770	(5.5)
Other	32	(13.8)	1,083	(7.8)
Disobey Other Control	4	(1.7)	66	(0.5)
Total	232	(100.0)	13,890	(100.0)
% Drivers Driving Properly (a)		(24.1)		(56.8)

24% OF INVOLVED NON-LICENCED DRIVERS WERE DRIVING PROPERLY COMPARED WITH 57% OF LICENCED DRIVERS.

THE MOST FREQUENT RECORDED IMPROPER DRIVING ATIONS FOR NON-LICENCED DRIVERS WERE "LOST CONTROL" AND "SPEED TOO FAST".

(a) Excluding "Not Known" and "Other".

Exhibit 3-12

TIME OF DAY OF VERSUS COLLISIONS FOR TOTAL COLLISIONS, COLLISIONS INVOLVING NON-LICENCED DRIVERS AND COLLISIONS INVOLVING ALCOHOL.

drivers

Time of Day	Collisions Involving Non-Licenced Drivers No.	(%)	% of Collisions Involving Alcohol	% of Total Collisions Occurring
12 - 1 a.m.	11	4.7	10.5	4.1
1 - 2 a.m.	20	8.6	15.9	4.9
2 - 3 a.m.	11	4.7	6.7	2.1
3 - 4 a.m.	6	2.6	3.7	0.9
4 - 5 a.m.	3	1.3	2.4	0.6
5 - 6 a.m.	-	-	0.4	0.6
6 - 7 a.m.	5	2.1	0.6	2.0
7 - 8 a.m.	-	-	0.8	3.4
8 - 9 a.m.	2	0.9	0.5	3.9
9 - 10 a.m.	1	0.4	0.3	2.7
10 - 11 a.m.	2	0.9	1.3	3.7
11 - 12 noon	8	3.4	0.4	4.4
12 - 1 p.m.	7	3.0	1.7	4.9
1 - 2 p.m.	9	3.9	0.7	5.5
2 - 3 p.m.	11	4.7	2.6	5.8
3 - 4 p.m.	14	6.0	3.0	7.7
4 - 5 p.m.	13	5.6	3.9	8.9
5 - 6 p.m.	21	9.0	4.4	7.2
6 - 7 p.m.	15	6.4	5.8	5.7
7 - 8 p.m.	16	6.9	6.0	5.5
8 - 9 p.m.	17	7.3	6.5	4.4
9 - 10 p.m.	16	6.9	6.9	3.7
10 - 11 p.m.	11	4.7	6.9	3.9
11 - 12 midnight	14	6.0	8.1	3.5
Totals	233	100.0	100.0	100.0

BETWEEN 6 P.M. AND 5 A.M., THERE WAS A HIGHER PROPORTION OF NON-LICENCED DRIVERS INVOLVED IN COLLISIONS.
ALCOHOL INVOLVEMENT IN COLLISIONS FOLLOWED A SIMILAR PATTERN.

Exhibit 3-13

IMPROPER DRIVER ACTIONS VS ENFORCEMENT

Column A	Column B		
Apparent Improper Driver Action	% of Improper Driver Actions In Collisions	% of All Comparable Charges Laid in 1978 by Hamilton-Wentworth Police	Column B / Column A
Follow too close	18.6	2.4	0.1
Speed too fast	5.2	47.3	9.1
Improper turn	13.8	12.3	0.9
Disobey traffic signal	8.3	16.6	2.0
Disobey stop sign	4.9	6.5	1.3
Fail to yield right-of-way	25.6	2.3	0.1
Improper passing	1.9	0.5	0.3
Wrong way on one-way street	0.5	2.4	4.8
Disobey other control	1.3	5.6	4.3
Other	19.9	4.1	0.2
	100.0	100.0	

44% OF IMPROPER DRIVER ACTIONS ASSOCIATED WITH COLLISIONS ARE DRIVER ACTIONS WHICH CANNOT BE READILY ENFORCED.

A PREDOMINANT NUMBER OF CHARGES WERE LAID UNDER LAWS WHICH ARE READILY ENFORCED.

Exhibit 3-14

MOTORCYCLE DRIVER AGE VS DRIVER ACTION

Driver Action	0 - 14	15 - 19	20 - 24	25 - 34	35 - 44	45 +	Total	(%)
Driving Properly	1	28	40	25	7	2	102	(54.2)
Following Too Close	-	6	4	2	-	-	12	(6.4)
Speed Too Fast	-	2	5	1	-	-	8	(4.3)
Improper Turn	-	2	-	-	-	-	2	(1.1)
Disobey Traffic Signal	-	-	1	1	-	-	2	(1.1)
Disobey Stop Sign	-	-	5	1	-	-	6	(3.2)
Fail to Yield R.O.W.	1	1	-	-	-	-	1	(0.5)
Improper Passing	-	4	-	1	-	-	5	(2.7)
Lost Control	-	10	7	6	-	-	23	(12.2)
Wrong Way One-Way Street	-	-	-	-	-	-	-	(-)
Not Known	-	4	4	7	-	1	16	(8.5)
Other	1	4	4	2	-	-	10	(5.3)
Disobey Other Control	-	-	-	1	-	-	1	(0.5)
Totals	3	61	70	47	7	3	188	(100.0)
% Involved Motorcycle Drivers Driving Properly(a)	50.0	52.8	64.5	65.8	100.0	100.0	63.0	
% Involved Vehicle Drivers Driving Properly(a)	27.2	49.1	54.5	61.6	61.7	62.4	56.4	

THE MOTORCYCLE DRIVER WAS MORE LIKELY TO BE DRIVING PROPERLY THAN A MOTOR VEHICLE OPERATOR IN THE SAME AGE GROUP.

THE MOST FREQUENT IMPROPER MOTORCYCLE DRIVER ACTION WAS "LOST CONTROL".

(a) Excluding "not known" and "other".

Exhibit 3-15

MOTORCYCLE INJURIES

Injury	Helmet in Use: Yes		No	Not Known	Total
None	10	(58.8) (a)	6	1	17
Minimal	29	(69.0)	11	2	42
Minor	66	(63.5)	35	3	104
Major	12	(60.0)	8	-	20
Fatal	5	(83.3)	1	-	6
Totals	122	(64.6)	61	6	189

91% OF MOTORCYCLISTS INVOLVED IN COLLISIONS FOR WHICH INJURY STATUS WAS RECORDED RECEIVED INJURIES. THE LIKELIHOOD OF INJURY WAS SIMILAR FOR HELMET USERS AND NON USERS (HELMETS OFFER PROTECTION ONLY FOR HEAD AND NECK INJURIES).

(a) Numbers in brackets are percentages of row totals.

Exhibit 3-16

MOTORCYCLE SAFETY EQUIPMENT UTILIZATION

Degree of Utilization

Safety Equipment Fitted	All In Use	None In Use	Not Known	Total
No Safety Equipment Fitted	-	62	-	62
Helmet	114	7	-	121
Not Known	-	-	6	6
Totals	114	69	6	189

38% OF MOTORCYCLISTS INVOLVED IN COLLISIONS WERE RECORDED AS NOT WEARING SAFETY HELMETS.

Exhibit 3-17

CYCLIST ACTION VS AGE OF CYCLIST

Apparent Cyclist Action	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24
Driving Properly	-	1	15	26	12
Following Too Close	-	-	-	1	-
Speed Too Fast	-	-	-	-	-
Improper Turn	-	3	6	1	2
Disobey Traffic Signal	-	-	1	1	1
Disobey Stop Sign	-	1	2	-	-
Fail to Yield Right-of-Way	-	13	7	5	3
Improper Passing	-	-	4	1	-
Lost Control	-	3	1	2	1
Wrong Way on One-Way Road	-	1	2	3	1
Not Known	2	4	10	3	1
Other	-	4	7	4	1
Disobey Other Control	-	-	-	3	-
Totals	2	30	55	50	22
% Involved Cyclists Driving Properly (a)	0.0	4.6	39.5	60.5	60.0

(a) Excluding "Not Known" and "Other".

25 - 34	35 - 44	45 - 54	55 +	Totals	Apparent (%)	Cyclist Action
10	1	3	-	68	(37.4)	Driving Properly
-	-	-	-	1	(0.6)	Following Too Close
-	-	-	1	1	(0.6)	Speed Too Fast
-	-	-	-	12	(6.6)	Improper Turn
-	-	-	-	3	(1.6)	Disobey Traffic Signal
-	-	-	-	3	(1.6)	Disobey Stop Sign
1	-	-	1	30	(16.5)	Fail to Yield Right-of-Way
-	1	-	-	6	(3.3)	Improper Passing
-	-	-	-	7	(3.8)	Lost Control
-	-	-	-	7	(3.8)	Wrong Way on One-Way Road
1	3	-	-	24	(13.2)	Not Known
1	-	-	-	17	(9.3)	Other
-	-	-	-	3	(1.7)	Disobey Other Control
13	5	3	2	182	(100.0)	Totals
90.9	50.0	100.0	0.0	48.2		% Involved Cyclists Driving Properly

CYCLISTS UNDER 15 WERE MOST LIKELY TO BE DRIVING IN A MANNER THAT VIOLATED BASIC RULES OF THE ROAD.

Chapter Four
Pedestrians

Cengage

General

In 1980, there were 444 pedestrian collisions resulting in 434 pedestrian injuries, and 12 fatalities.

Age

The relationship between the Regional population distribution and pedestrian involvement in collisions in 1980 was reviewed (Exhibit 4-1). It was determined that 5 to 9 year old pedestrians had a disproportionate rate of collision involvement when compared on the basis of the age distribution of the Regional population.

The variations in rate might be explained by certain pedestrian age groups crossing streets more frequently than others (i.e. exposure). It is, however, unlikely that the 5 to 9 year old and 10 to 14 year old groups have different exposures to traffic and therefore the 5 to 9 year old pedestrian would appear to be considerably more prone to collision involvement.

Pedestrian Action

Exhibit 4-2 indicates the pedestrian action at the time of the collision versus pedestrian age. In general, the instances of unsafe pedestrian action for pedestrians involved in collisions were greater for pedestrians under 15 years of age.

This exhibit also indicates that the actions of "coming from behind a parked car" or "unexpectedly running into the roadway" accounted for 27 percent of the pedestrian actions at the time of the collisions. These unsafe actions are particularly associated with pedestrians under 9 years of age.

Time of Collision

An analysis was performed on the time of day of collisions compared to pedestrian age (Exhibit 4-3) and it was determined that 32 percent of pedestrians were injured in collisions which occurred between 3 p.m. and 6 p.m. Eighty pedestrian collisions involved children between 5 and 14 years of age at school crossing times.* This represented 18 percent of the 444 pedestrian collisions in 1980 or 55 percent of all collisions involving 5 - 14 year olds.

* School crossing times: 8:00 a.m. - 9:15 a.m., 11:30 a.m. - 1:45 p.m., 3:30 p.m. - 4:45 p.m., Monday - Friday; excluding July 1 - September 3, Inclusive.

Pedestrian Condition

In most cases, the condition of the pedestrian involved in the collision was reported as normal. However, in approximately 6 percent of the collisions involving pedestrians, the pedestrian condition was recorded as "had been drinking" or "impaired" (Exhibit 4-4).

Locations

Exhibit 4-5 indicates the pedestrian age for pedestrians involved in collisions compared with the type of traffic control. In 50 percent of the pedestrian collisions, the collision occurred at a mid-block or other location with no control. For pedestrians under 10 years of age, 62 percent or more were involved at mid-block or other locations with no control. This is to be expected, as the majority of collisions that involved a young pedestrian resulted from the pedestrian entering the roadway unexpectedly.

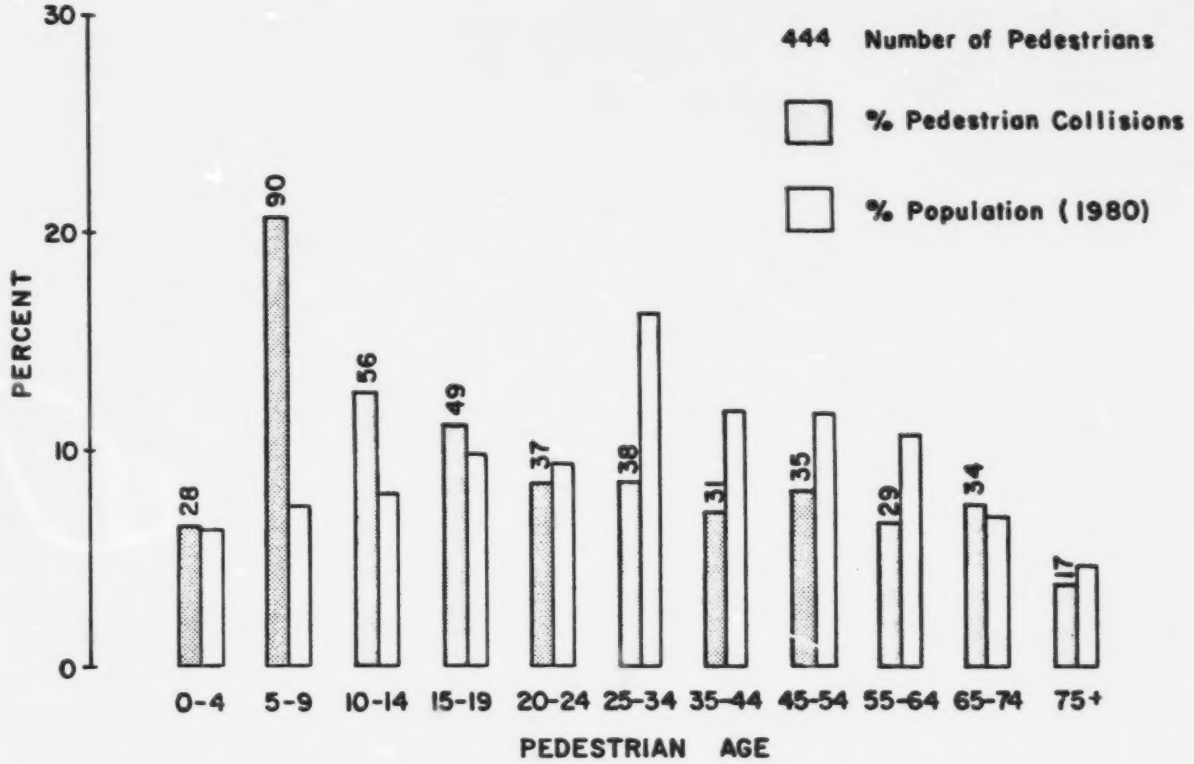
Driver Action

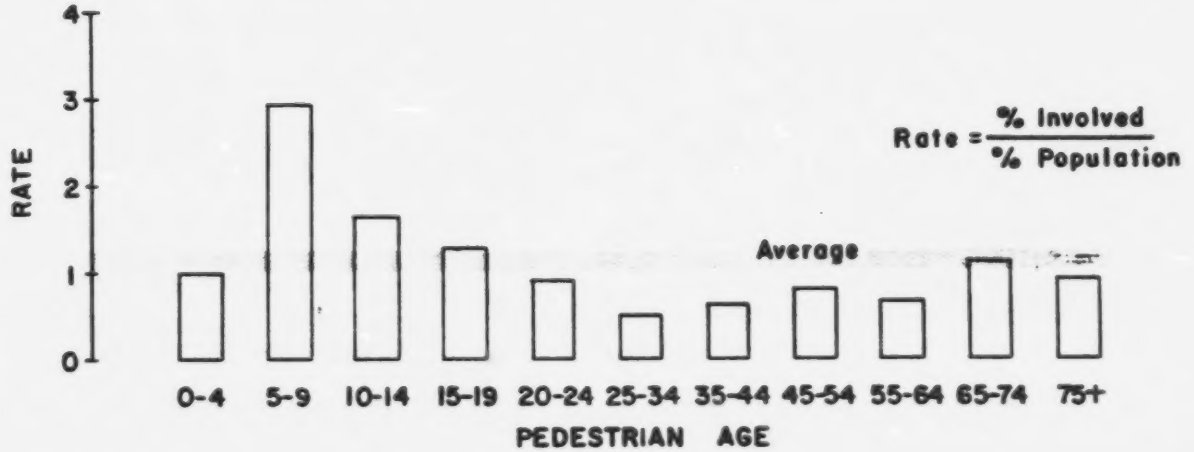
Exhibit 4-6 indicates that in approximately 66 percent of the motor vehicle-pedestrian collisions, the driver was recorded as driving properly. This figure does not necessarily suggest that the drivers involved in these collisions were totally without blame but does indicate that a majority of pedestrian collisions are associated with improper pedestrian action or lack of awareness of traffic conditions at the time of the collision.

Of the 34 percent of motor vehicle-pedestrian collisions in which the driver was not driving properly, the most frequently recorded driver action was failing to yield the right-of-way (associated with 13 percent of all motor vehicle-pedestrian collisions).

Exhibit 4-1

PEDESTRIAN AGE VS POPULATION





5 TO 9 YEAR OLD PEDESTRIANS HAD A COLLISION INVOLVEMENT ALMOST 3 TIMES THE AVERAGE.

Exhibit 4-2

PEDESTRIAN AGE VS ACTION

Pedestrian Action	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34
Crossing intersection with right-of-way	3	9	8	10	8	7
Crossing intersection without right-of-way	1	11	9	8	5	2
Crossing intersection - no control	-	1	2	3	4	3
Walk with traffic	-	-	-	3	1	-
Walk against traffic	-	-	-	1	1	-
On sidewalk or shoulder	2	1	2	4	4	5
Play/work on highway	2	-	1	-	1	-
Come from behind parked car	13	17	4	1	2	2
Run into roadway	6	40	16	5	2	2
Cross through traffic	1	7	9	10	2	7
Other	-	4	5	4	7	10
Totals	28	90	56	49	37	38
% Involved Pedestrians with Unsafe Action (Excluding "other")	82.1	86.0	76.5	60.0	43.3	46.4

35 - 44	45 - 54	55 - 64	65 - 74	75 +	Total	(%)	Pedestrian Action
9	10	12	17	5	98	(22.1)	Crossing intersection with right-of-way
5	3	3	4	3	54	(12.2)	Crossing intersection without right-of-way
-	1	1	1	-	16	(3.6)	Crossing intersection - no control
-	2	-	-	-	6	(1.4)	Walk with traffic
1	1	-	1	-	5	(1.1)	Walk against traffic
2	3	2	3	-	28	(6.3)	On sidewalk or shoulder
1	-	-	-	-	5	(1.1)	Play/work on highway
-	-	-	2	-	41	(9.2)	Came from behind parked car
3	1	1	2	2	80	(18.0)	Ran into roadway
5	6	6	2	4	59	(13.3)	Cross through traffic
5	8	4	2	3	52	(11.7)	Other
31	35	29	34	17	444	(100.0)	Totals
53.8	51.9	40.0	31.3	69.2	62.5		% Involved Pedestrians with Unsafe Action (Excluding "other")

IN GENERAL, THE INSTANCES OF UNSAFE PEDESTRIAN ACTIONS WERE HIGHER FOR AGE GROUPS UNDER 15 AND OVER 75.

27% OF PEDESTRIANS INVOLVED IN COLLISIONS ENTERED THE ROADWAY UNEXPECTEDLY (CAME FROM BEHIND PARKED OR RAN INTO THE ROADWAY).

Exhibit 4-3

TIME OF DAY VS PEDESTRIAN AGE

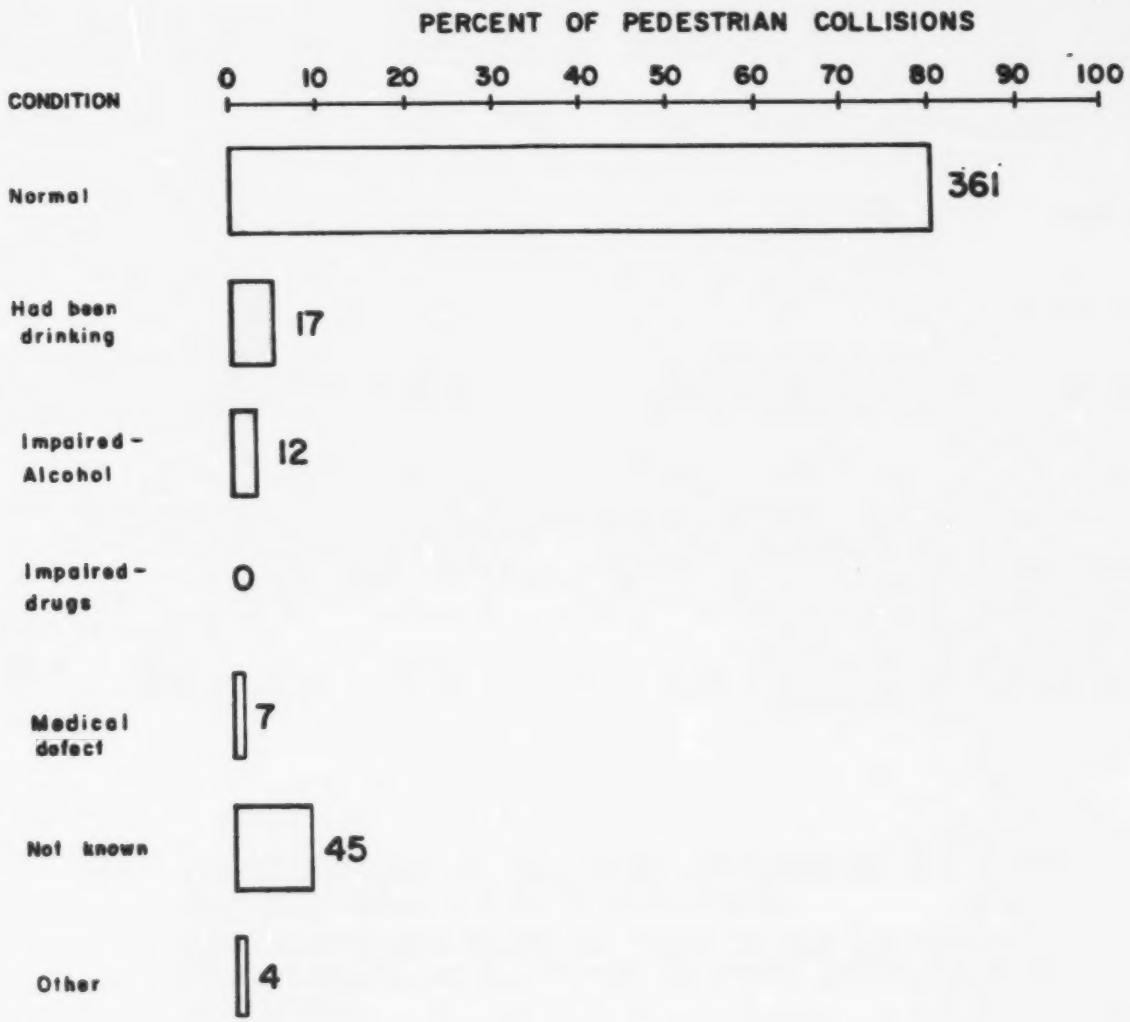
Time of Day	0-4 Yrs	5-9 Yrs	10-14 Yrs	15-19 Yrs	20-24 Yrs	25-34 Yrs	35-44 Yrs	45-54 Yrs	55-64 Yrs	65-74 Yrs	75 + Yrs	Row Total
12 - 1 a.m.	-	-	-	1	3	3	-	-	1	-	1	9
1 - 2 a.m.	-	-	-	1	2	1	3	1	1	-	-	9
2 - 3 a.m.	-	-	-	2	1	2	-	-	-	-	-	5
3 - 4 a.m.	-	-	1	1	1	-	-	-	-	-	-	3
4 - 5 a.m.	-	-	-	-	-	-	-	-	-	-	-	-
5 - 6 a.m.	-	-	-	-	-	-	1	-	-	-	-	1
6 - 7 a.m.	-	-	-	-	2	1	-	1	1	-	-	5
7 - 8 a.m.	-	-	-	-	-	5	4	4	1	1	-	15
8 - 9 a.m.	-	11	3	3	2	1	-	1	1	1	-	23
9 - 10 a.m.	-	-	-	-	-	2	-	-	3	2	1	8
10 - 11 a.m.	1	4	-	2	-	1	1	1	1	2	7	20
11 - 12 noon	3	12	3	4	4	3	5	2	2	2	-	40
12 - 1 p.m.	1	9	6	1	-	-	1	4	-	-	-	22
1 - 2 p.m.	3	11	10	3	1	2	1	2	2	-	1	36
2 - 3 p.m.	1	2	2	3	2	1	1	-	2	3	4	21
3 - 4 p.m.	3	14	6	5	2	2	3	5	1	5	1	47
4 - 5 p.m.	4	12	8	7	3	7	4	2	5	5	1	58
5 - 6 p.m.	5	5	6	3	1	3	4	1	3	6	-	37
6 - 7 p.m.	3	4	3	2	4	1	1	1	2	1	-	22
7 - 8 p.m.	1	2	4	-	-	1	1	4	-	2	1	16
8 - 9 p.m.	3	1	2	4	3	1	1	2	2	1	-	20
9 - 10 p.m.	-	1	2	-	1	1	-	2	1	1	-	9
10 - 11 p.m.	-	2	-	5	1	-	-	1	-	-	-	9
11 - 12 a.m.	-	-	-	2	4	-	-	1	-	2	-	19
Total	28	90	56	49	37	38	31	35	29	34	17	444

32% OF PEDESTRIANS WERE INJURED IN COLLISIONS WHICH OCCURRED BETWEEN 3 P.M. AND 6 P.M.

NOTE: 2 pedestrian ages are not stated.

Exhibit 4-4

PEDESTRIAN CONDITION



6.5 PERCENT OF THE PEDESTRIANS INVOLVED IN COLLISIONS WERE IMPAIRED BY OR HAD BEEN DRINKING ALCOHOL.

Exhibit 4-5

PEDESTRIAN AGE VS TYPE OF TRAFFIC CONTROL

Type of Control	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34	35 - 44
Traffic Signal	6	19	19	18	17	12	13
Stop Sign	3	16	7	4	5	5	8
School Guard	-	1	-	-	-	-	1
No Control	19	54	30	27	15	21	9
Totals	28	90	56	49	37	38	31
% Pedestrian Collisions at Midblock or Other Locations With No Control	67.9	60.0	53.6	55.1	40.5	55.3	29.0

(a) 2 pedestrian ages not stated.

45 - 54	55 - 64	65 - 74	75 +	Totals	(%)	Type of Control
14	17	15	8	158	(35.6)	Traffic Signal
4	2	6	1	61	(13.7)	Stop Sign
-	-	-	-	2	(0.5)	School Guard
17	10	13	8	223	(50.2)	No Control
35	29	34	17	444[a]	(100.0)	Totals
48.6	34.5	38.2	47.1	50.2		% Pedestrian Collisions at Mid-Block or Other Locations With No Control

50% OF PEDESTRIAN COLLISIONS OCCURRED AT MID-BLOCK OR OTHER LOCATIONS WITH NO CONTROL.

FOR PEDESTRIANS UNDER 10 YEARS OF AGE 62% OR MORE WERE INVOLVED AT MID-BLOCK OR OTHER LOCATIONS WITH NO CONTROL.

Exhibit 4-6

DRIVER ACTION IN PEDESTRIAN COLLISIONS

Action	In Pedestrian Collisions	% Pedestrian Collisions
Driving Properly	263	66.1
Following Too Closely	3	0.7
Speed Too Fast	3	0.7
Improper Turn	4	1.0
Disobey Traffic Signal	11	2.7
Disobey Stop Sign	1	0.3
Fail to Yield Right-of-Way	52	13.1
Improper Passing	-	-
Wrong Way One-Way Street	1	0.3
Lost Control	4	1.0
Not Known	37	9.3
Other	19	4.8
Disobey Other Control	-	-
	398	100.0

66% OF THE MOTOR VEHICLE DRIVERS INVOLVED IN PEDESTRIAN COLLISIONS WERE RECORDED AS DRIVING PROPERLY.

THE MOST FREQUENTLY RECORDED IMPROPER DRIVER ACTION WAS FAILURE TO YIELD THE RIGHT-OF-WAY.

(a) Note - approximately 5% of pedestrian collisions involved more than one driver or vehicle.

Chapter Five
Vehicles

Vehicle Type

For drivers involved in collisions, the percentage of drivers driving properly was higher than average for conventional and school bus drivers (Exhibit 5-1). Caution should be exercised when interpreting this exhibit as there is no indication of vehicle exposure.

Vehicle Defects

Vehicle defects were recorded for 131 or less than 2 percent of the vehicles involved in 1979 collisions (Exhibit 5-2). The most frequently recorded defect was a poor or ineffective vehicle braking system. Although a vehicle defect was recorded, it does not necessarily follow that the defect was the proximate cause of the collision.

Exhibit 5-1

DRIVER ACTION VS VEHICLE TYPE

Driver Action	Non-motor Vehicle	Passenger Car	Car and Trailer	Truck	Truck and Semi
Driving Properly	68	6,120	9	452	68
Follow Too Close	1	935	1	73	13
Speed Too Fast	1	260	-	18	2
Improper Turn	14	671	1	64	22
Disobey Traffic Signal	3	427	1	27	7
Disobey Stop Sign	3	243	1	22	-
Fail to Yield R.O.W.	30	1309	2	97	11
Improper Passing	4	89	-	8	1
Lost Control	7	779	-	55	3
Wrong Way on One-Way	7	28	-	2	-
Not Known	24	710	2	61	18
Other	17	977	2	103	21
Disobey Other Control	3	63	-	1	4
Totals	182	12,611	19	983	170
% Involved Drivers Driving Properly (a)	(48.2)	(56.0)	(60.0)	(55.2)	(51.9)

FOR DRIVERS INVOLVED IN COLLISIONS, THE PERCENTAGE OF DRIVERS DRIVING PROPERLY WAS HIGHER THAN AVERAGE FOR DRIVERS OF CONVENTIONAL-TYPE BUSES AND SCHOOL BUSES.

(a) Excluding "not known" and "other".

Motor-Cycle	Bus	School Bus	Other	Totals	(%)	Driver Action
102	153	8	6	6,986	(48.5)	Driving Properly
12	8	1	-	1,044	(7.3)	Follow Too Close
9	1	-	2	293	(2.0)	Speed Too Fast
2	10	-	1	785	(5.5)	Improper Turn
2	1	-	-	468	(3.2)	Disobey Traffic Signal
6	-	-	-	275	(1.9)	Disobey Stop Sign
1	9	1	-	1,460	(10.1)	Fail to Yield R.O.W.
5	2	-	-	109	(0.8)	Improper Passing
23	1	1	-	869	(6.0)	Lost Control
-	-	-	-	37	(0.3)	Wrong Way on One-Way
16	9	1	1	842	(5.9)	Not Known
10	17	-	1	1,148	(8.0)	Other
1	1	-	-	73	(0.5)	Disobey Other Control
189	212	12	11	14,389	(100.0)	Totals
(62.6)	(82.3)	(88.9)	(66.7)	(56.3)		% Involved Drivers Driving Properly (a)

Exhibit 5-2

VEHICLE DEFECTS

Defect Type	Non-Motor Vehicles	Passenger Cars	Truck	Tractor & Semi	Motor Cycle	Bus	Totals	(%)
Brakes	1	35	6	3	-	1	46	(35.1)
Steering	-	2	1	1	-	-	4	(3.1)
Tire Puncture or Blowout	-	17	1	-	-	-	18	(13.8)
Tire Tread Insufficient	-	20	1	1	1	1	24	(18.3)
Headlamps Defective	2	1	-	1	1	-	5	(3.8)
Other Lamps or Reflectors Defective	2	4	-	1	-	-	7	(5.3)
Engine Control Defective	-	12	-	-	-	-	12	(9.2)
Wheels or Suspension Defective	-	5	-	-	-	-	5	(3.8)
Vision Obscured	-	2	-	1	-	-	3	(2.3)
Trailer Hitch Defective	-	3	2	2	-	-	7	(5.3)
Totals	5	101	11	10	2	2	131	(100.0)
Defective Vehicles as a % of all vehicles of the same type involved in collisions	2.7	0.8	1.1	5.9	1.1	0.9	0.9	

DEFECTIVE BRAKES ACCOUNTED FOR 35.1% OF THE RECORDED DEFECTS.

Chapter Six
Environment

Light Conditions

Exhibit 6-1 indicates that most collisions occurred under clear visibility conditions. Although weather conditions can occasionally make driving more difficult, collisions under poor weather conditions may be more associated with drivers failing to adjust properly to changed conditions; particularly those associated with the roadway surface. Exhibit 6-2 indicates that 63 percent of the collisions occurred under daylight conditions.

Road Surface

An estimated 65 percent of collisions occurred under dry pavement conditions (Exhibit 6-3). The estimate is based on the 80 percent of cases where two roadway surface conditions were indicated on the collision report form.

Pavement Markings

In accordance with Exhibit 6-4, an estimated 81 percent of collisions occurred on marked roadways where the markings were visible. Similar to the road surface analysis, this estimate is based on collisions which had road conditions and markings reported for two roadways. In over 75 percent of the cases where the road markings were recorded as not visible or obscured, snow, slush, or ice conditions were also reported. It is important to note that pavement markings that are not visible to the driver are not necessarily associated with collision cause. Further analysis would be necessary to indicate whether or not there was a causal relationship.

Road Character

Exhibit 6-5 indicates that an estimated 65 percent of collisions occurred on two-way undivided roadways. There is no normalizing data available at this time which would serve to indicate that one type of road character was less prone to collision involvement than another.

As estimated 85 percent of collisions occurred on straight and level roadways where two roadways were reported on the collision report (Exhibit 6-6). Again, because exposure data and causation are not implied by the exhibit, caution should be exercised when interpreting this information.

Road Location and Traffic Control

Exhibit 6-7 indicates that the greatest number of collisions occurred at non-intersection locations. If the intersection-related and in-intersection categories are combined, there were a greater number of collisions directly or indirectly related to intersections. As the exposure to vehicle conflicts is inherently greater at intersection locations, this result is not unexpected. Exhibit 6-8 indicates the specific traffic control present at each collision location and indicates that 53 percent of all collisions occurred at mid-block locations or other locations with no control.

Road Condition

An estimated 98 percent of roads were in good condition at the time of the collision (Exhibit 6-9). Although some roadways were under construction or under repair in the vicinity of the collision, this does not directly imply that road condition was a contributing cause of the collision.

Fixed Objects

There were 1,254 recorded cases where vehicles struck fixed objects by the roadside (Exhibit 6-10). Thirty-one percent of the fixed objects struck by vehicles were rigid poles. A higher proportion (47%) of fixed object collisions resulted in personal injuries or fatalities than resulted from all collision types (39%) (Exhibit 6-11). In 73% of all fixed object collisions, a single motor vehicle left the roadway and struck a roadside object as its primary impact. In the remaining cases (27%), it would appear that the fixed object was struck after impact with another vehicle or pedestrian.

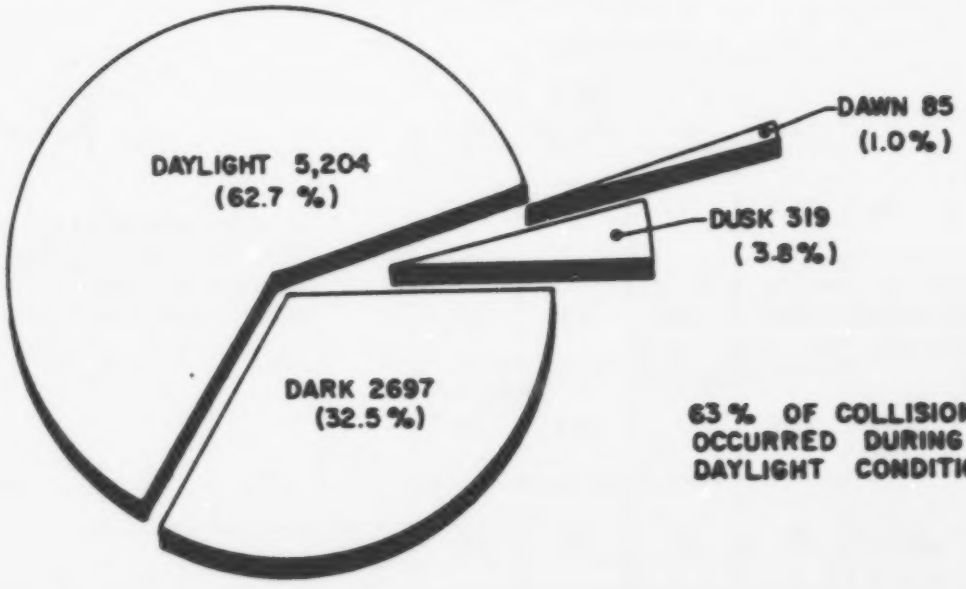
Exhibit 6-1

VISIBILITY CONDITIONS

80 % OF COLLISIONS OCCURRED DURING CLEAR VISIBILITY CONDITIONS.

Exhibit 6-2

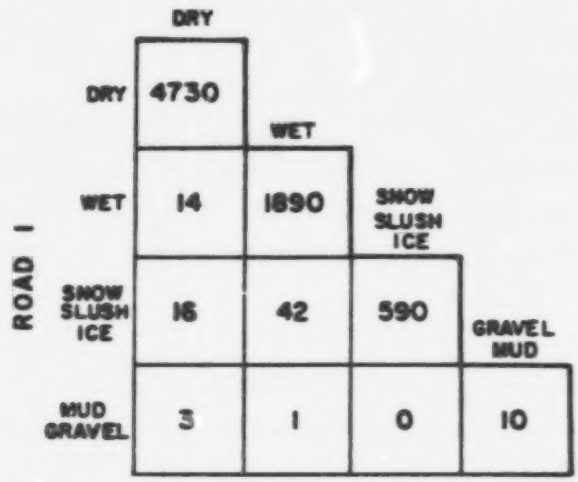
LIGHT CONDITIONS



63 % OF COLLISIONS OCCURRED DURING DAYLIGHT CONDITIONS.

Exhibit 6-3

ROAD SURFACE CONDITIONS



AN ESTIMATED (a) 65% OF COLLISIONS OCCURRED UNDER DRY PAVEMENT CONDITIONS.

Exhibit 6-4

ROAD 1 PAVEMENT MARKINGS VERSUS ROAD SURFACE CONDITIONS

SURFACE	GOOD	FAIR	NOT VISIBLE OBSCURED	NONE
DRY	4507	142	40	864
WET	1829	77	42	215
SNOW SLUSH ICE	179	11	256	116
MUD GRAVEL	5	0	2	20

MARKINGS

AN ESTIMATED (a) 81% OF COLLISIONS OCCURRED ON MARKED ROADWAYS WHERE THE MARKINGS WERE VISIBLE.

(a) IN 29% OF THE CASES, ROAD 2 INFORMATION WAS NOT RELEVANT AND WAS NOT RECORDED.

Exhibit 6-5

ROAD CHARACTER

ROAD 1

ROAD 2	ONE-WAY UNDIVIDED	TWO-WAY UNDIVIDED	DIVIDED BARRIER	DIVIDED	TRANSFER LANES RAMPS
ONE-WAY UNDIVIDED	1141				
TWO-WAY UNDIVIDED	758	4594			
DIVIDED BARRIER	46	86	113		
DIVIDED	71	123	4	157	
TRANSFER LANES RAMPS	4	13	1	3	4

AN ESTIMATED (a) 65% OF COLLISIONS OCCURRED ON TWO-WAY UNDIVIDED ROADWAYS

Exhibit 6-6

ROAD ALIGNMENT

ROAD 1

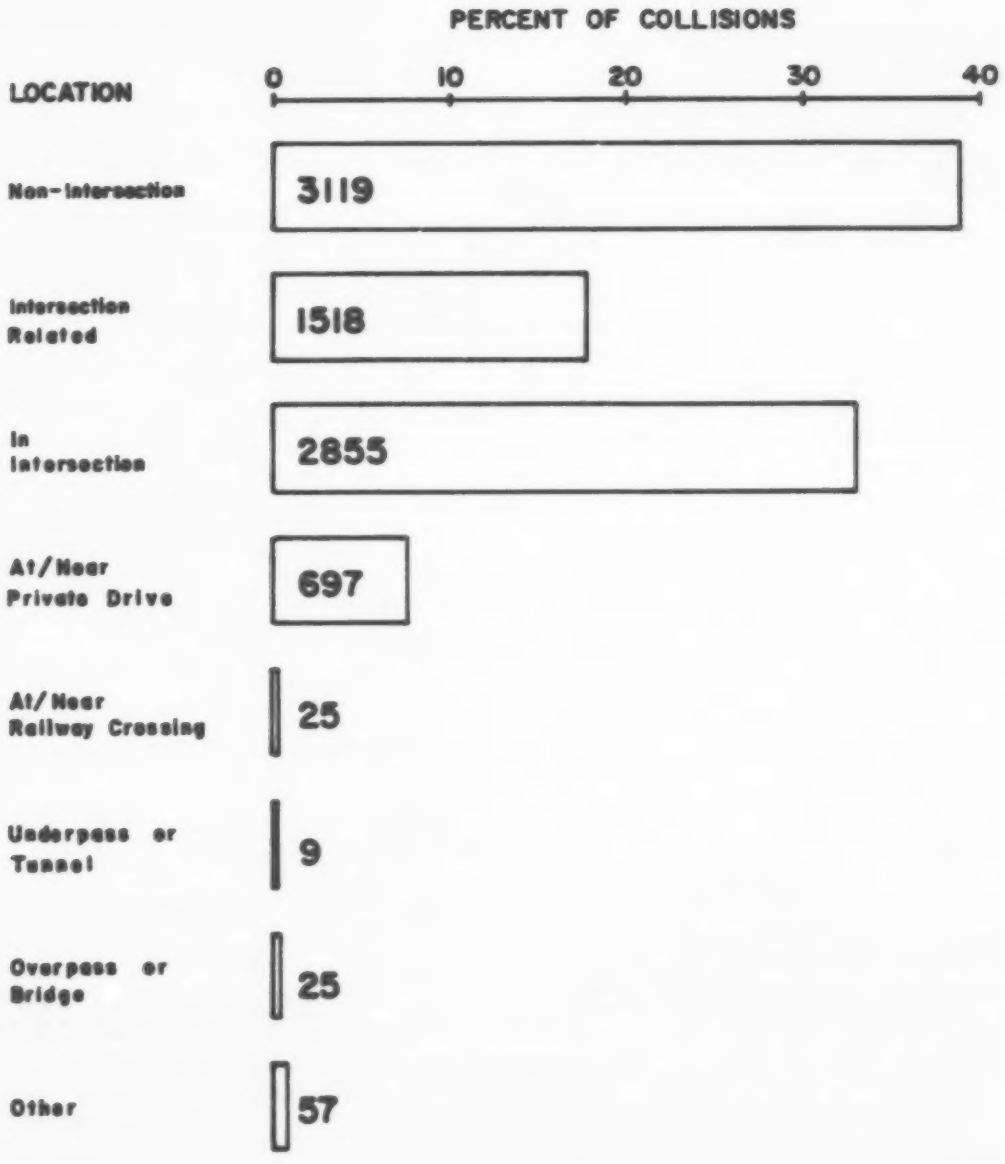
ROAD 2	STRAIGHT & LEVEL	STRAIGHT ON HILL	CURVE ON LEVEL	CURVE ON HILL
STRAIGHT & LEVEL	5972			
STRAIGHT ON HILL	384	198		
CURVE ON LEVEL	172	23	70	
CURVE ON HILL	125	37	11	98

AN ESTIMATED (a) 84% OF COLLISIONS OCCURRED ON STRAIGHT AND LEVEL ROADWAYS.

(a) IN 20% OF CASES, ROAD 2 INFORMATION WAS NOT RELEVANT AND WAS NOT RECORDED.

Exhibit 6-7

LOCATION OF COLLISIONS



47% OF COLLISIONS OCCURRED AT NON-INTERSECTION LOCATIONS

Exhibit 6-8

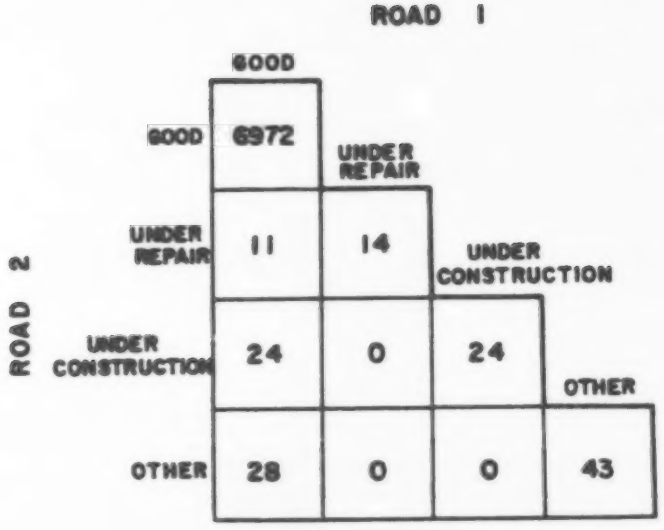
TRAFFIC CONTROL VS CLASS OF COLLISION

Traffic Control	Fatal Injury	Non-Fatal Injury	Property Damage Only	Totals	(%)
Traffic Signal	8	982	1,243	2,233	(26.9)
Stop Sign	5	581	944	1,530	(18.4)
Yield Sign	0	28	31	59	(0.7)
Non Oper.Stop Sign	0	1	0	1	(0.0)
Police Control	0	1	2	3	(0.0)
School Guard	0	3	0	3	(0.0)
School Bus	0	4	1	5	(0.1)
No Control	18	1,639	2,778	4,435	(53.4)
Other	2	14	20	36	(0.4)
Totals	33	3,253	5,019	8,305	(100.0)

53% OF ALL COLLISIONS OCCURRED AT MID-BLOCK LOCATIONS OR OTHER LOCATIONS WITH NO CONTROL.

Exhibit 6-9

ROAD CONDITION



AN ESTIMATED (a) 98% OF ROADWAYS WERE IN GOOD CONDITION (I.E. NOT UNDER REPAIR OR UNDER CONSTRUCTION AT THE TIME OF THE COLLISION

(a) IN 14% OF THE CASES, ROAD 2 INFORMATION WAS NOT RELEVANT AND WAS NOT RECORDED.

Exhibit 6-10

FIXED OBJECTS STRUCK VERSUS ROAD LOCATION

Object Struck	ROAD LOCATION Non-Intersection	Intersection Related	In Intersection	Private Drive	Railroad Crossing	Underpass or Tunnel	Overpass or Bridge	Other	Total	(%)
Restraining Barrier	68	16	10	1	0	0	3	2	100	(7.0)
Rigid Pole	253	78	65	16	1	0	1	5	419	(29.6)
Break-away Pole	43	23	18	3	1	0	1	0	89	(6.3)
Tree	87	20	16	8	0	0	1	1	133	(9.4)
Post (Sign; Parking Meter)	41	14	19	4	0	0	0	0	78	(5.5)
Fence	53	13	14	9	2	0	1	1	93	(6.6)
Culvert	14	3	0	4	0	0	0	0	21	(1.5)
Bridge Support	6	0	2	1	0	5	3	1	18	(1.3)
Rock Face	4	0	1	0	0	0	0	2	7	(0.5)
Ditch	78	17	9	13	0	0	0	0	117	(8.3)
Curb	33	30	32	10	0	0	0	2	107	(7.5)
Crash Cushion	1	0	0	0	0	0	0	0	1	(0.1)
Building or Wall	31	15	21	6	0	0	0	4	77	(5.4)
Other	81	23	25	14	4	1	0	7	155	(11.0)
Total	793	252	232	89	8	6	10	25	1,415	(100.0)

31% OF THE FIXED OBJECTS STRUCK BY VEHICLES WERE RIGID POLES.

environment

Exhibit 6-11

FIXED OBJECT VERSUS CLASS OF COLLISION

OBJECT STRUCK	CLASS OF COLLISION: FATAL	PERSONAL INJURY	PROPERTY DAMAGE ONLY	TOTAL	% SINGLE MOTOR VEHICLE
Restraining Barrier	1	37	62	100	80.0
Rigid Pole	7	204	208	419	79.7
Breakaway Pole	-	47	42	89	84.3
Tree	1	64	68	133	76.7
Post, Sign, Parking Meter	-	29	49	78	69.2
Fence	-	38	51	93	58.1
Culvert	-	9	12	21	90.5
Bridge Support	-	11	7	18	83.3
Rock Face	-	2	5	7	71.4
Ditch	-	60	57	117	80.3
Curb	2	48	57	107	38.3
Crash Cushion	-	-	1	1	66.7
Building or Wall	9	21	46	77	66.2
Other	2	61	92	155	66.5
TOTAL	14	649	752	1415	72.6

In 73% of collisions in which a fixed object was struck, the collision involved a single motor vehicle. 10 of these collisions were fatal.

Chapter Seven
Locations

Technische Universität Chemnitz

General

Locations that have high numbers or rates of collision occurrences have received regular attention by roadway authorities in the Region and countermeasures are constantly being implemented on existing facilities and incorporated into the design of new facilities. However, physical alterations are not effective in preventing the majority of traffic collisions as these are the direct result of driver or pedestrian error.

More comprehensive data are now available due to the ongoing development of computer-assisted analysis techniques.

High Frequency Locations

Exhibit 7-1 represents a list of the 50 locations which experienced the highest number of collision occurrences in 1980. All 1980 collisions occurring at traffic signals were subjected to the control chart analysis technique (Exhibit 7-2). Additional information including collision data from previous years is included with this exhibit.

These exhibits do not necessarily represent priority lists for improvements as other factors have to be taken into account such as cost-benefit considerations or the deployment of other countermeasure opportunities which may be more cost-effective.

In many cases, these locations are already under consideration for various forms of improvement on a priority basis.

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR URBAN STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

Exhibit 7-1

INTERSECTIONS WITH HIGHEST NUMBER OF COLLISIONS IN 1980 (a)

	Intersection	Type of Traffic Control	Number of Collisions	5 Yr. Avg.
1.	Queenston/Centennial	Traffic Signal	29	29.0
2.	Main/John	Traffic Signal	26	21.2
3.	Queenston/Nash	Traffic Signal	26	19.6
4.	Beckett's Drive/Garth	No Control (curve)	24	12.8
5.	Main/Victoria	Traffic Signal	24	26.2
6.	Mohawk/Upper Gage	Traffic Signal	24	23.0
7.	Burlington/Parkdale	Traffic Signal	23	17.8
8.	King/James (N. Branch and S. Branch)	Traffic Signal	23	18.0
9.	Barton/Centennial	Traffic Signal	22	20.0
10.	King/Dundurn	Traffic Signal	21	16.8
11.	Main/Balmoral	2-Way Stop	21	16.2
12.	Charlton/Sherman	Traffic Signal	20	13.0
13.	Main/Macklin	Traffic Signal	19	10.0
14.	Barton/Woodward	Traffic Signal	18	18.0
15.	Main/Bay	Traffic Signal	18	11.2
16.	Main/Dundurn	Traffic Signal	18	21.4
17.	Barton/Robins	2-Way Stop	17	14.4
18.	Barton/John	Traffic Signal	16	13.0
19.	Main/Locke	Traffic Signal	16	8.2
20.	York/Dundurn	Traffic Signal	16	9.8
21.	Barton/Gage	Traffic Signal	15	15.8
22.	Fennell/Upper Gage	Traffic Signal	15	21.0
23.	King/Victoria	Traffic Signal	15	17.4

	Intersection	Type of Traffic Control	Number of Collisions	5 Yr. Avg.
24.	Main/James	Traffic Signal	15	16.4
25.	Mohawk/Garth	Traffic Signal	15	19.0
26.	Mohawk/Upper Ottawa	Traffic Signal	15	14.0
27.	Queenston/Parkdale	Traffic Signal	15	16.2
28.	Barton/Parkdale	Traffic Signal	14	16.8
29.	Fennell/Upper Ottawa	Traffic Signal	14	14.6
30.	Hunter/John	Traffic Signal	14	13.8
31.	King/Centennial	Traffic Signal	14	16.6
32.	Queensdale/Upper Gage	Traffic Signal	14	10.0
33.	Barton/Strathearne	Traffic Signal	13	8.6
34.	Cannon/Ferguson	2-Way Stop	13	13.0
35.	Cannon/Hughson	Traffic Signal	13	13.0
36.	Cannon/Victoria	Traffic Signal	13	12.6
37.	Delawana/Centennial	Traffic Signal	13	9.6
38.	Jackson/James	Traffic Signal	13	8.4
39.	Main/Gage	Traffic Signal	13	8.2
40.	Mohawk/Upper Sherman	Traffic Signal	13	17.2
41.	Aberdeen/Dundurn	Traffic Signal	12	9.0
42.	Brampton/Parkdale	Traffic Signal	12	12.4
43.	Burlington/Ottawa	Traffic Signal	12	7.4
44.	Charlton/Queen	Traffic Signal	12	9.4
45.	Fennell/Upper Sherman	Traffic Signal	12	18.0
46.	Jackson/Catharine	2-Way Stop	12	5.8
47.	Hunter/Hess	Traffic Signal	12	7.6
48.	King/Catharine	Traffic Signal	12	7.8

	Intersection	Type of Traffic Control	Number of Collisions	5 Yr. Avg.
49.	Mohawk/Upper Paradise	Traffic Signal	12	10.0
50.	Wilson/Hughson	2-Way Stop	12	8.0
51.	Barton/Frederick	Traffic Signal	11	5.2
52.	Barton/Kenilworth	Traffic Signal	11	11.0
53.	Cannon/Catharine	Traffic Signal	11	4.8
54.	Cannon/John	Traffic Signal	11	6.8
55.	Fennell/Upper James	Traffic Signal	11	9.8
56.	Industrial/Ottawa	Traffic Signal	11	10.0
57.	King/John	Traffic Signal	11	12.0
58.	King/Mount Albion	Traffic Signal	11	10.4
59.	King/Wellington	Traffic Signal	11	11.8
60.	Main/Ottawa	Traffic Signal	11	15.6
61.	Main/Sherman	Traffic Signal	11	12.0
62.	Main/Wellington	Traffic Signal	11	15.2
63.	Mohawk/Upper James	Traffic Signal	11	12.8
64.	York/Queen	Traffic Signal	11	9.6

(a) Only collisions occurring within 31 feet (9.5 m) of the intersection are defined as beng "in" the intersection, and are included on this list.

Exhibit 7-2

SIGNALIZED INTERSECTIONS WITH HIGHEST COLLISION RATES IN 1980 *

	Intersection	$\frac{R_1}{R_c}$	R_1 (a)	R_c (b)	1980 (c) AWDT	Number of Collisions 1980	1979	1978	1977	5 YR AVG.
1.	Hunter/Hess	2.51	3.65	1.45	8,500	12	11	7	6	7.6
2.	Charlton/Sherman Access	2.49	3.26	1.31	18,900	20	8	14	10	13.0
3.	Mohawk/U. Gage (e)	2.41	3.02	1.25	20,400	24	26	23	22	23.0
4.	Main/Macklin	2.01	2.55	1.27	19,600	19	8	8	8	10.0
5.	Queenston/Nash	1.86	2.20	1.18	33,500	26	23	17	16	19.6
6.	Queensdale/U. Gage	1.84	2.40	1.30	17,900	15	10	5	13	10.0
7.	Barton/John	1.80	2.33	1.30	17,500	15	20	11	10	13.0
8.	Mohawk/U. Ottawa	1.71	2.19	1.28	17,900	15	15	11	14	14.0
9.	Charlton/Queen	1.66	2.21	1.33	16,500	12	12	8	10	9.4
10.	Queenston/Centennial	1.59	1.80	1.13	44,800	29	26	22	32	29.0
11.	Jackson/James	1.56	2.03	1.30	18,100	13	6	7	10	8.4
12.	Main/John	1.50	1.70	1.14	43,100	26	23	13	22	21.2
13.	Cannon/Hughson (f)	1.49	1.92	1.29	19,200	13	-	-	-	13.0
14.	Fennell/U. Gage	1.48	1.85	1.25	23,400	15	22	23	18	21.0
15.	Fennell/U. Ottawa	1.48	1.87	1.27	20,000	14	17	13	7	14.6
16.	Hunter/John	1.43	1.80	1.26	23,300	14	14	13	12	13.8
17.	Main/Victoria	1.34	1.52	1.13	45,000	24	20	28	32	26.2
18.	Barton/Woodward	1.32	1.56	1.18	31,600	18	18	18	24	18.0
19.	Cannon/Catherine	1.32	1.71	1.30	17,900	11	1	3	8	4.8
20.	Kentley/Nash (f)	1.31	1.80	1.38	14,300	8	-	-	-	8.0
21.	Burlington/Parkdale	1.25	1.41	1.13	45,900	23	16	10	21	17.8
22.	Hunter/Caroline (f)	1.25	1.89	1.51	7,000	5	3	-	-	4.0

	Intersection	$\frac{R_1}{R_c}$	R_1 (a)	R_c (b)	1980 AADT (c)	Number of Collisions 1980	1979	1978	1977	5 YR AVG.
23.	Mohawk/Garth (e)	1.22	1.48	1.21	28,300	15	19	20	24	19.0
24.	King/James	1.21	1.64	1.36	13,300	8	8	1	4	5.6
25.	Mohawk/U. Sherman (d)	1.20	1.49	1.24	23,400	13	14	23	17	17.2
26.	King/Dundurn	1.19	1.35	1.14	47,100	21	13	12	22	16.8
27.	King/James	1.19	1.43	1.20	29,100	15	10	10	13	12.4
28.	Mohawk/U. Paradise	1.19	1.46	1.23	26,700	13	10	11	11	10.0
29.	Bendamere/Garth	1.18	1.60	1.35	15,100	8	9	1	4	5.6
30.	Brampton/Parkdale	1.16	1.45	1.25	24,400	12	22	12	7	12.4
31.	Main/Bay	1.16	1.34	1.16	38,300	18	5	8	9	11.2
32.	Barton/Frederick	1.13	1.42	1.26	21,500	11	3	4	3	5.2
33.	Barton/Strathearne (f)	1.13	1.38	1.22	28,000	13	10	8	3	8.6
34.	Governors/Ogilvie (Dundas)	1.12	1.54	1.38	14,400	7	1	9	-	5.7
35.	Aberdeen/Dundurn	1.11	1.37	1.24	25,504	12	7	12	9	9.0
36.	Charlton/Bay	1.10	1.51	1.37	14,600	7	4	2	2	3.4
37.	York/MacNab (f)	1.10	1.44	1.30	17,900	9	-	-	-	9.0
38.	Hester/U. Wellington	1.09	1.60	1.47	10,100	5	0	0	0	1.6
39.	Barton/Centennial	1.07	1.19	1.11	56,400	22	24	20	18	20.0
40.	Barton/Gage	1.06	1.24	1.18	36,000	15	21	16	18	15.8
41.	Cannon/John	1.06	1.32	1.24	24,500	11	4	5	13	6.8
42.	Fennell/U. Sherman	1.06	1.30	1.23	28,800	12	17	22	23	18.0
43.	Fennell/U. Wentworth	1.06	1.37	1.29	18,500	9	12	9	8	8.8
44.	York/Dundurn	1.06	1.23	1.17	38,400	16	12	6	11	9.8
45.	King/Victoria	1.05	1.23	1.18	38,000	15	14	13	20	17.4
46.	Burlington/Wentworth	1.03	1.30	1.26	23,900	10	9	2	3	7.0

	Intersection	$\frac{R_1}{R_c}$	R_1 (a)	R_c (b)	1980 AADT (c)	Number of Collisions 1980	1979	1978	1977	5 YR AVG.
47.	King/Centennial Pkwy.	1.03	1.20	1.17	35,500	15	20	14	10	16.6
48.	Queenston/Parkdale	1.03	1.20	1.16	35,700	16	19	16	11	16.2
49.	King/Catherine	1.02	1.24	1.22	29,400	12	4	6	8	7.8
50.	Cannon/Victoria	1.00	1.19	1.19	32,500	13	12	16	10	12.6
51.	Limeridge/Garth	1.00	1.38	1.39	12,500	6	8	5	8	6.6

NOTES:

(a) R_1 is the number of collisions per million vehicles entering occurring within 31 feet of an individual intersection in 1979.

(b) R_c is a volume-adjusted critical rate, above which one can state with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.

$$R_c = R_a + K\sqrt{\frac{R_a}{m}} - \frac{0.5}{m}$$

where R_a = systemwide average collision rate for all traffic signal locations (1.04 collisions per million vehicle entries in 1979).

K = constant = 1.65 (for 95% confidence level)

m = vehicle exposure at the location in million vehicles entering per year (AADT x 365)

(c) AWDT - Average Weekday Daily Traffic; AADT - Average Annual Daily Traffic

(d) Reconstructed with full channelization in 1980.

(e) Reconstructed with full channelization in 1981.

(f) Rates are calculated using data only for period that intersection has been signalized (--) indicates period prior to installation of signal.

(*) Note: Rates presented are for 1980 only. Rates may fluctuate significantly from year-to-year.

Appendix

Appendix

Exhibit A-1

CAUSES OF DEATH (a) 1976

	Rate/100,000 Population	
	Canada	Ontario
Circulatory System	355.2	375.8
Neoplasms	153.1	154.4
Accidents, Poisonings, Violence (Including traffic accidents)	66.8	58.7
Respiratory System	51.3	49.0
Digestive System	27.2	27.5
Traffic Accidents	22.2	17.8
Endocrine, Nutritional & Metabolic	16.1	15.7
Perinatal	9.5	8.7
Ill Defined	9.5	8.1
Genito-Urinary System	8.4	8.0
Nervous System	7.9	7.1
Congenital Anomalies	6.9	6.2
Mental Disorders	4.7	5.9
Infective and Parasitic Diseases	4.4	3.7
Musculoskeletal System	2.5	2.4
Blood and Blood Forming Organs	2.2	2.0
Pregnancy Childbirth	0.5	0.6

(a) Statistics Canada, Vital Statistics, Volume III, 1976.

Exhibit A-2

ACCIDENTAL (a) CAUSES OF DEATH 1976

	Number		Death Rate/100,000	
	Canada	Ontario	Canada	Ontario
Traffic Accidents	**5,110**	**1,470**	**22.2**	**17.8**
Accidental Falls	1,820	671	7.9	8.1
Fires	765	266	3.3	3.2
Drowning	731	191	3.2	2.3
Industrial	672	208	2.9	2.5
Accidental Poisoning	526	205	2.3	2.5
Other Transport	520	164	2.3	2.0
Firearms	89	17	0.4	0.2
Motor Vehicle (non-traffic related)	62	26	0.3	0.3
All Other	956	314	4.2	3.8

(a) Statistics Canada, Vital Statistics, Volume III, 1976.

Exhibit A-3

ACCIDENTAL

CAUSES OF DEATH (a) 1976
(15 YRS. OF AGE AND UNDER)

	Number of Fatalities In Canada
Traffic Accidents	546
Drowning	225
Fires	167
Industrial	74
Accidental Falls	48
Other Transport	36
Firearms	28
Accidental Poisoning	22
Motor Vehicle (non-traffic related)	16
All Other	194

(a) Statistics Canada, Vital Statistics, Volume III, 1976.

Exhibit A-4

POPULATION AND REGISTRATION

Year	Population	Motor Vehicle Registration (a)		Ratio: Motor Vehicle Registration to Population
	Hamilton	Ontario	Hamilton	
1950	n/a	1,104,080	47,043	
1951	201,296	1,205.098	50,648	0.25
1952	210,060	1,291,753	55,169	
1953	216,921	1,406,119	59,808	
1954	222,907	1,489,980	62,728 (b)	
1955	225,608	1,617,853	67,497	
1956	233,019	1,710,240	70,034 (b)	0.30
1957	243,097	1,793,499	72,156	
1958	251,256	1,868,922	75,763	
1959	258,576	1,973,737	80,365	
1960	263,750	2,062,484	82,823	
1961	266,707	2,126,270	85,667	0.32
1962	268,908	2,177,148	83,779	
1963	264,706	2,268,320	89,005	
1964	278,260	2,381,219	93,208	
1965	283,099	2,516,680	102,171	
1966	285,649	2,643,474	107,506	0.38
1967	291,536	2,736,366	107,521	
1968	293,397	2,869,588	116,452	
1969	296,875	2,953,789	116,135	
1970	298,755	3,047,599	114,760	
1971	303,177	3,209,862	120,727	0.39
1972	304,391	3,382,497	134,623 (b)	
1973	305,382	3,583,379	140,687	
1974	401,932 (e)	3,891,603	154,886 (d)	
1975	408,466 (e)	4,079,108	162,348 (d)(g)	
1976	409,331 (e)	4,089,954 (c)	162,780 (d)	0.52 (f)
1977	411,358 (e)	4,274,410 (c)	170,122 (d)	
1978	407,486 (e)	n/a	n/a (h)	
1979	407,758 (e)	n/a	n/a	
1980	410,503 (e)	n/a	n/a	

Exhibit A-5

MOTOR VEHICLE ACCIDENT DEATHS AND RATES

YEAR	DEATHS			RATES/10,000 REGISTERED MOTOR VEHICLES		
	Canada	Ontario	Hamilton	Canada	Ontario	Hamilton
1931	1,316	574	31	10.96	10.21	
1932	1,120	497	20	10.05	9.35	
1933	955	416	22	8.82	8.00	
1934	1,115	528	27	9.82	9.74	
1935	1,224	571	16	10.42	10.12	
1936	1,316	564	23	10.61	9.56	
1937	1,642	774	39	12.37	12.41	
1938	1,545	677	33	11.08	10.12	
1939	1,584	682	35	11.01	9.99	n/a
1940	1,723	756	46	11.46	10.74	
1941	1,852	835	45	11.78	11.30	
1942	1,409	610	49	9.24	8.53	
1943	1,437	563	41	9.51	8.14	
1944	1,374	526	28	9.14	7.79	
1945	1,556	637	25	10.39	9.61	
1946	1,781	729	33	10.98	10.25	
1947	1,869	753	26	10.17	9.41	
1948	2,086	782	19	10.25	8.94	5.34
1949	2,265	873	29	9.89	9.00	n/a
1950	2,270	850	12	8.74	7.70	2.55
1951	2,686	991	26	9.36	8.22	5.13
1952	2,701	1,040	26	8.56	8.05	4.71
1953	2,906	1,082	17	8.47	7.69	2.84
1954	1,960 (a)	1,045	17	5.38 (a)	7.01	2.71
1955	2,084 (a)	1,111	15	5.28 (a)	6.87	2.22
1956	3,184	1,180	25	7.46	6.90	3.57
1957	3,260	1,279	25	7.25	7.13	3.46
1958	3,118	1,112	21	6.61	5.94	2.77
1959	3,231	1,187	18	6.44	6.01	2.24

YEAR	DEATHS			RATES/10,000 REGISTERED MOTOR VEHICLES		
	Canada	Ontario	Hamilton	Canada	Ontario	Hamilton
1960	3,283	1,166	21	6.25	5.65	2.54
1961	3,426	1,286	19	6.21	6.05	2.22
1962	3,883	1,383	32	6.72	6.35	3.82
1963	4,210	1,421	27	6.93	6.26	3.03
1964	4,652	1,424	32	7.29	5.98	3.43
1965	4,902	1,611	27	7.31	6.40	2.64
1966	5,281	1,596	28	7.51	6.04	2.60
1967	5,429	1,719	39	7.26	6.28	3.63
1968	5,318	1,586	22	6.74	5.53	1.89
1969	5,425	1,683	19	6.57	5.70	1.64
1970	5,080	1,535	23	5.97	5.04	2.00
1971	5,573	1,769	23	6.17	5.51	1.91
1972	6,221	1,934	46	6.56	5.72	3.42
1973	6,706	1,959	23	6.60	5.47	1.63
1974 (b)	6,290	1,748	31	5.72	4.49	2.00
1975	6,061	1,800	26	5.29	4.41	1.60
1976			29			1.78
1977	n/a		34	n/a		2.00
1978			47			n/a
1979			42			n/a
1980			33			n/a

(a) Except Quebec.

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

NOTES:

(a) Registration is for all vehicles including automobiles, station wagons and commercial vehicles. Sources of data, Hamilton Police Reports, R. L. Polk and Company, Statistics Canada and The Ministry of Transportation and Communications of Ontario.

(b) Data not available. Estimated from provincial value.

(c) Estimated by the Ministry of Transportation and Communications.

(d) Data estimated from provincial value for City of Hamilton only.

(e) Population for Regional Municipality of Hamilton-Wentworth.

(f) For City of Hamilton only.

(g) R. L. Polk estimate for Region of Hamilton-Wentworth for 1975 - 180,084.

(h) Ministry of Transportation and Communications estimate for Region based on licence sales only, for 1978 - 176,576.

Exhibit A-6

HAMILTON/HAMILTON-WENTWORTH PEDESTRIAN INJURY RATES HISTORIC TRENDS

YEAR	PEDESTRIAN	
	Injuries Per 1,000 Population	Fatalities Per 100,000 Population
1951	1.41	7.45
1952	2.13	6.19
1953	2.14	4.14
1954	1.97	5.83
1955	2.29	3.10
1956	1.92	9.01
1957	2.16	6.17
1958	1.78	5.57
1959	1.76	5.03
1960	1.60	4.93
1961	1.96	4.12
1962	1.84	4.83
1963	2.11	5.67
1964	1.89	7.19
1965	2.05	6.00
1966	2.07	5.95
1967	1.89	5.83
1968	2.11	3.41
1969	2.03	2.02
1970	1.81	4.69
1971	1.84	4.29
1972	1.76	6.90
1973	1.87	2.95
1974 (a)	1.41	3.23
1975	1.28	2.69
1976	1.18	3.42
1977	1.22	2.43
1978	1.34	6.14
1979	1.14	3.68
1980	1.03	2.93

Note: See also Exhibit 1-2

(a) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit A-7

TRENDS DATA
REGRESSION EQUATIONS

Statistic	Years	Equation (a)	Significant Slope at 95%	99% (b)
1. Injury Collision Rate	1954 - 1980	y = 0.131 x + 5.85	Yes	Yes
2. Injury Collision Rate	1965 - 1980	y = -0.129 x + 9.81	Yes	Yes
3. Personal Injury Rate	1951 - 1980	y = 0.271 x + 5.81	Yes	Yes
4. Personal Injury Rate	1963 - 1980	y = -0.071 x + 12.88	No	No
5. Pedestrian Injury Rate	1951 - 1980	y = -0.027 x + 2.18	Yes	Yes
6. Fatality Rate - All Collisions	1951 - 1980	y = -0.033 x + 9.73	No	No
7. Pedestrian Fatality Rate	1951 - 1980	y = -0.098 x + 6.39	Yes	Yes

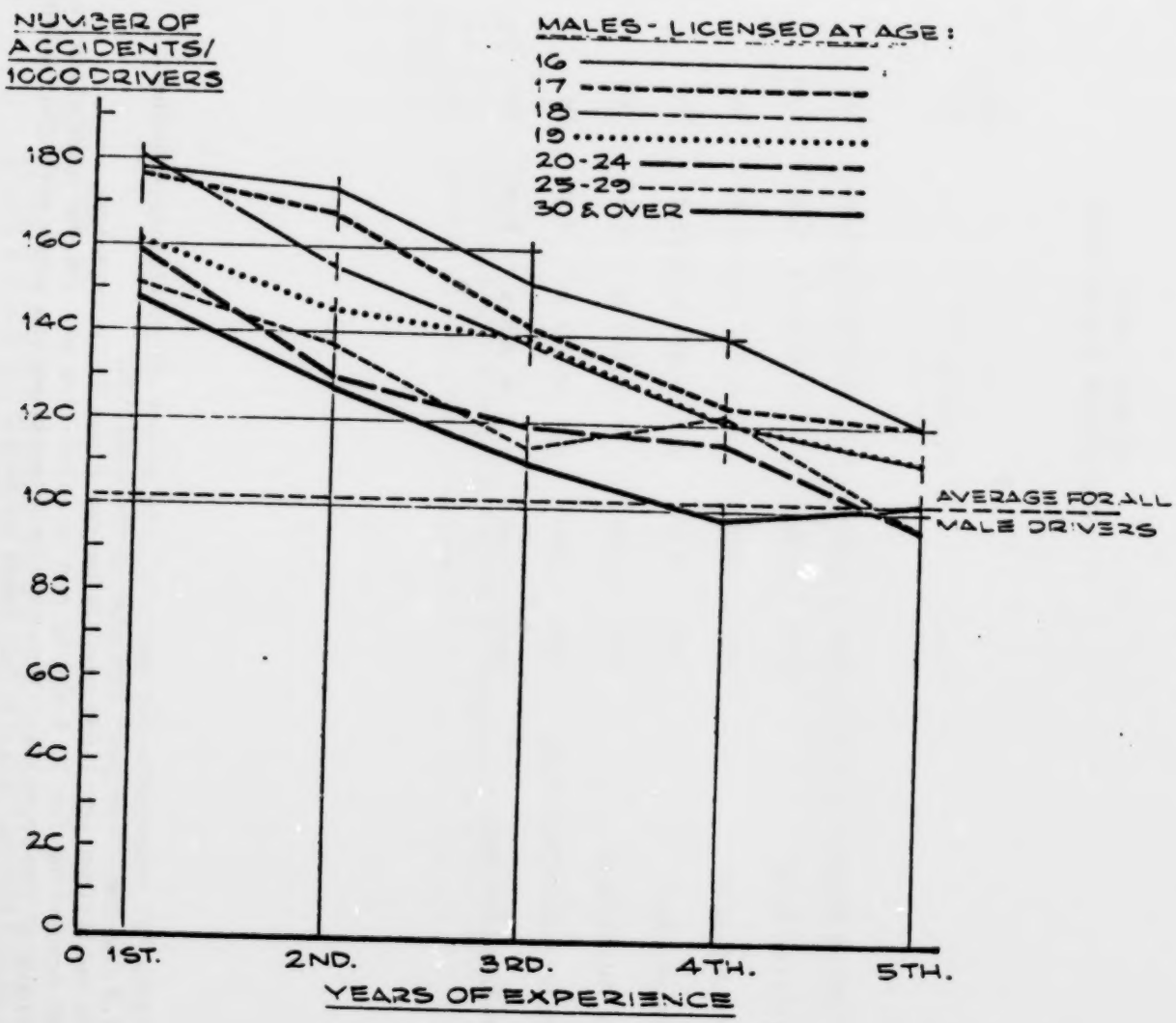
(a) The variable "x" represents the year; "y" the number of collisions expected.
"x" is 1.0 for the first year included in the equation.
"y" is in collisions per 1,000 population for 1 and 2; in injuries per 1,000 population for 3, 4 and 5; and in fatalities per 100,000 population in 6 and 7.

(b) If the slope of the regression line is significant, we can state with the indicated level of confidence that the slope is <u>not</u> equal to zero.

appendix

Exhibit A-8

IT TAKES ABOUT FIVE YEARS FOR NEW DRIVERS TO REDUCE THEIR ACCIDENT RATE TO THE PROVINCIAL AVERAGE



SOURCE - SYSTEMS RESEARCH & DEVELOPMENT,
ONTARIO MINISTRY OF TRANSPORTATION & COMMUNICATIONS

...WENTWORTH COLLISION REPORT

Exhibit A-9

COLLISION STATISTICS - SELECTED CANADIAN CITIES

City or Regional Municipality	Population	Property Damage Only Collision Reporting Level	Collision Reporting Criteria(1)	Total Collisions	Collisions/ 1,000 Population	Injury Collisions	Injury Collisions/ 1,000 Population
Regional Hamilton-Wentworth	410,503 (1980)	$400.00	(a)	8,305 (1980)	20.2	3,286	8.0
City of Hamilton	306,640 (1980)	$400.00	(a)	6,852 (1980)	22.4	2,675	8.7
Calgary	600,000 (1981)	$350.00	(a)(c)(d)	41,016 (1980)	68.4	1,169	1.9
Edmonton	505,707 (1980)	$350.00	(a)	31,985 (1980)	63.2	4,742	9.4
Halifax	117,882 (1976)	$500.00	(a)(c)(e)	5,303 (1980)	45.0	676	5.7
London	260,000 (1981)	$400.00	(a)	9,042 (1980)	34.8	2,932	11.3
City of Montreal	1,069,700 (1979)	$100.00	N/A	42,500 (1979)	39.7	7,305	6.8
Regional Ottawa-Carleton	548,995 (1980)	$400.00	(a)	13,566 (1980)	30.2	3,623	6.6
Regina	158,900 (1981)	$200.00	(b)	7,720 (1980)	48.6	779	4.9
Saskatoon	150,150 (1980)	$200.00	(a)	7,883 (1980)	52.5	767	5.1
Metro Toronto	2,143,492 (1980)	$400.00	(a)(d)(f)	56,776 (1980)	26.5	15,785	7.4
Vancouver	404,665 (1980)	$200.00	(a)	28,210 (1980)	69.7	3,867	9.6
Windsor	197,000 (1980)	$400.00	(a)(c)	5,405 (1980)	27.4	1,352	6.9
Winnipeg	604,300 (1979)	$300.00	(a)(c)(g)	20,271 (1980)	33.5	3,805	6.3

(1) KEY TO CRITERIA FOR REPORTING COLLISIONS
- (a) Collision reported if it involves any personal injury
- (b) Personal injury collisions reported only if medical attention is required
- (c) Violation of Provincial Highway Traffic Act with property damage only and less than reporting level
- (d) Hit and run collisions must be reported
- (e) Violation of Criminal Code of Canada
- (f) Government vehicle involved
- (g) Collisions involving roadside construction equipment

Appendix

Exhibit A-10

FATAL COLLISION STATISTICS - CANADIAN AND U.S. CITIES*

CITY	# OF FATALITIES 1980	RATE PER 100,000 POPULATION	RATE PER 10,000 REGISTERED VEHICLES
HAMILTON (1)	22	7.4	1.3
AVERAGE OF ALL CANADIAN CITIES REPORTING TO N.S.C. (8 CITIES)	305	10.6	2.5
Calgary, Alta	56	16.9	3.8
Edmonton, Alta	52	13.8	3.2
Lethbridge, Alta	7	19.1	4.1
Medicine Hat, Alta	2	8.0	1.8
Vancouver, B.C.	60	14.6	2.4
London, Ont.	22	11.3	3.0
Montreal, Que.	84	6.9	2.1
AVERAGE OF ALL U.S. CITIES, POPULATION 200,000 - 350,000 REPORTING TO N.S.C. (17 CITIES)	6.4	14.2	2.0
Birmingham, Ala.	38	13.6	1.8
Mobile, Ala.	32	15.4	2.9
Anchorage, Alas.	24	11.9	1.3
Tucson, Ariz.	95	28.7	4.4
Anaheim, Cal.	22	10.6	1.3
Oakland, Cal.	34	10.0	1.7
Colorado Sprgs, Colo.	28	13.5	1.8
Tampa, Fla.	38	14.4	1.6
Wichita, Kans.	44	16.4	2.0
Baton Rouge, La.	35	11.3	2.5
Shreveport, La.	26	12.9	1.8
Albuquerque, N.M.	50	16.9	2.1
Rochester, N.Y.	18	7.5	1.0

CITY	# OF FATALITIES 1980	RATE PER 100,000 POPULATION	RATE PER 10,000 REGISTERED VEHICLES
Austin, Tex.	51	16.0	2.0
Corpus Christi, Tex.	41	19.1	2.6
Richmond, Va.	9	4.1	0.6
Virginia Beach, Va.	29	11.8	2.0

NOTE:

(1) Rate is for City of Hamilton only.

*SOURCE: Accident Facts, 1981 Edition, National Safety Council, 444 N. Michigan Avenue, Chicago, Ill.

POOR

QUALITY

ORIGINAL